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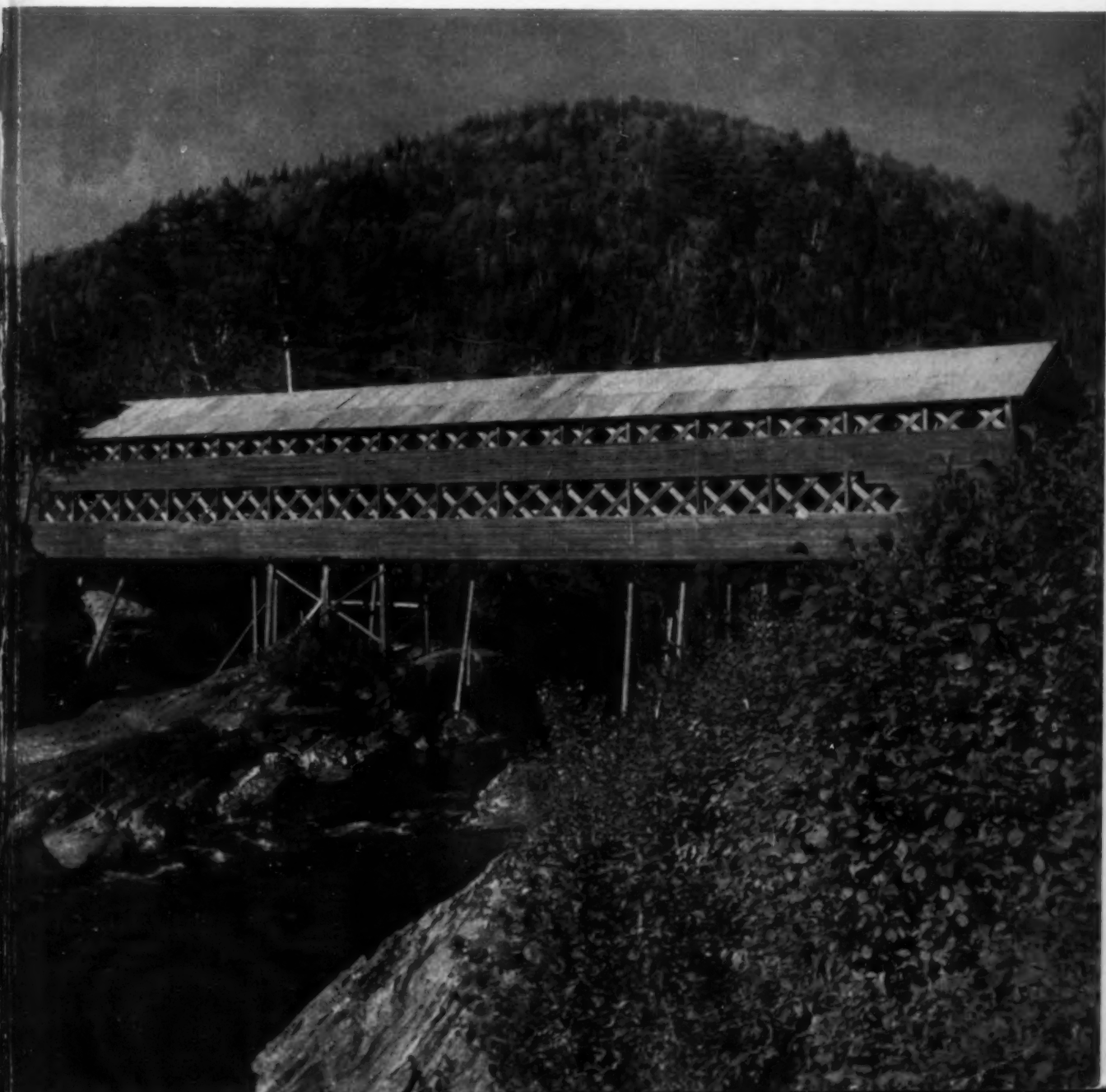
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THE CANADIAN GEOGRAPHICAL SOCIETY

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The Society's ambition is to make itself a real force in advancing geographical knowledge, and in disseminating information on the geography, resources and people of Canada. In short, its aim is to make Canada better known to Canadians and to the rest of the world.

As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, the Canadian Geographical Journal, which is devoted to every phase of geography—historical, physical and economic—of Canada, of the British Commonwealth and of the other parts of the world in which Canada has special interest. It is the intention to publish articles in this magazine that

will be popular in character, easily read, well illustrated and educational to the young, as well as informative to the adult.

The Canadian Geographical Journal will be sent to each member of the Society in good standing. Membership in the Society is open to any one interested in geographical matters. The annual fee for membership is four dollars (Canadian currency).

The Society has no political or other sectional associations, and is responsible only to its members. All money received is used in producing the Canadian Geographical Journal and in carrying on such other activities for the advancement of geographical knowledge as funds of the Society may permit.



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A British Columbia purse-seiner in action in the Gulf of Georgia.

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CONTENTS

MARCH, 1952 + VOLUME XLIV + NUMBER 3

COVER SUBJECT:—Covered bridge across the Assametsquagan River in the Matapedia valley of eastern Quebec. (See page 128)
Capital Press

	Page
AUSTRALIAN CAPITALS	96
by E. O. HOPPE	
THE CANADIAN GEOGRAPHICAL SOCIETY'S NATIONAL SCHOLARSHIPS IN GEOGRAPHY	108
CANADA'S PACIFIC SALMON	109
by RODERICK L. HAIG-BROWN	
CANADA'S COVERED BRIDGES	128
by PHIL SHACKLETON	
BEGINNING OF THE CANADIAN RED CROSS	138
by MAX BRAITHWAITE	
EDITOR'S NOTE-BOOK	IX
AMONGST THE NEW BOOKS	IX
THE CANADIAN GEOGRAPHICAL SOCIETY ANNUAL MEETING	X
1951 SUPPLEMENT TO "A REGIONAL BIBLIOGRAPHY"	XI

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Left:—St. Mary's Cathedral in Sydney (capital of New South Wales) is attractively situated on the border of Hyde Park.

E. O. Hoppé

Right:—Sydney's vast Harbour Bridge; its main span measures 1,650 feet.

E. O. Hoppé

Below:—Manly Beach, flanked by an avenue of Norfolk pines, is one of the loveliest of Sydney's surf beaches.

Below right: — Though seven miles from the city proper (a pleasant half-hour's ferry journey) Manly Beach attracts thousands of sea- and sun-bathers from Sydney every warm week-end.



Australian Capitals

by E. O. HOPPÉ

Australian official photographs, except where otherwise credited.

SYDNEY, capital of New South Wales, has an almost unfair advantage in her natural setting; so much has been said and written in praise of her harbour that the greatest tribute is, perhaps, the silence which overtakes the animated crowd on the deck of the incoming liner as the vessel swings in between the Heads. The beauty is of both colour and form; the sea appears to wind in and about the city in a thousand bays and inlets, and curls along a coastal line of wooded slopes where balconied houses of pleasantly varied design are set among trees like pearls amidst emeralds in a coronet of red-gold earth.

The vast Harbour Bridge now provides an impressive continuity where formerly the line of vision was broken by a gap. If you are impressed by facts and can build a picture in your mind from figures, consider a few of the bridge's dimensions: the main span is 1,650 feet, the main approach nearly 4,000 feet. Besides a central roadway 57 feet wide, there are four electric railway tracks and two footways, each ten feet wide.

Sydney is a city still in the making. There are good buildings and bad ones, a curious mixture of synthetic architectural styles ranging from the Renaissance Town Hall to Gothic churches, from a Corinthian-pillared Art Gallery to a Tudor Government House. While much of the layout of the older sections of the city is haphazard and undisciplined, the newer parts are well planned and spacious, the buildings being constructed of ripe-tinted sandstone; and there are signs that climatic advantages are now recognized, for there is evident a breaking away from the English traditions of the first settlers who, coming from the cold-grey

shores of the home-country, could not readily acclimatize themselves to the fact that henceforth they would be children of the sun and need not huddle in dark airless homes in narrow streets.

The Australian of today has indeed become a sun-worshipper *par excellence*, whether he live in Sydney or in any of the other capitals of the Commonwealth. Office, flat and bungalow are usually within easy reach of the beach, so what is more natural than that every possible minute should be spent in the enjoyment of surfing and sun-bathing, between blue sky and golden sands—splashed with scarlet, turquoise, jade and orange as bathers lie immobile after the excitement of being tossed and buffeted while riding on the crest of the sea-horses as they gallop shoreward.

If dignified Melbourne (seat of Government for the Commonwealth until 1927) cannot compete with urbane Sydney in picturesqueness, the Victorian capital, with a population of more than one million, scores heavily by the wealth of its fine parks and magnificent boulevards. While the business centre of Sydney is a network of crooked narrow streets without much pretence to architectural beauty, Melbourne's wide thoroughfares suggest the inherited civic pride of their builders, a pride which has preserved its stern opposition to any institu-

Right:—Sydney's Government House, with its turrets and crenellations, resembles a great baronial castle.

E. O. Hoppé





Above:—The Exhibition Building, Melbourne (Victorian capital) — which has served as hospital, church, parliament house, etc., during its seventy years — is the largest building in Australia.



Left:—Huge crowds watch the horses returning to the weighing enclosure after the running of the Mimosa Stakes at Flemington race course on Melbourne Cup Day.



Below, left and right:—On Henley Regatta Day spectators line the banks of the Yarra River; one of the attractions is the "Parade of Canoes", when girls in gay summer dresses are paddled along the river in decorated craft.

tion which tends to detract from the ordered dignity of the city. Nevertheless, it is progressive and competitive and well worthy of Sydney's steel.

Melbourne is also proud of its position as the centre of Australian cultural life. It encourages the arts, music and theatre probably more than does any other city in the Commonwealth.

The busy commercial centre with its multitude of attractive stores and steady flow of shoppers, imposing blocks of offices and big business concerns, recalls London's Oxford Street, but the city as a whole has something of the atmosphere of the cathedral town of England surrounded by a belt of factories, or rather it suggests the spirit of Boston, U.S.A., putting up a dignified defence against the encroaching tide of levity.

Melbourne's chief glory is the Yarra River which flows at the very threshold of the city. A rather melancholy Government House looks from its hill-crest across the wooded slopes of the Botanic Gardens (said to be the best laid-out in the world) down to the broad river, whose curving banks are lined with the boat-houses of rowing-clubs and gaily bedecked house-boats. Always an animated and colourful scene of river life, it reaches its climax on Henley Regatta Day, which ranks only second in popularity with Australia's great sporting classic, Melbourne Cup Day.

Australia seems to have an unusually large number of public holidays, which may account for the fact that race-meetings occupy a very prominent place in the life of almost every Australian. The love of sport is ingrained in everyone. This is easily understood in a country where the national hobby of horsemanship has been raised to the status of a fine art. To witness the crowds on Cup-Day is almost guaranteed to destroy for ever the impression that the Commonwealth is sparsely populated!

From Melbourne it is convenient to cross the two-hundred-mile-wide Bass Strait and visit Australia's island state, Tasmania. Its

Collins Street, Melbourne, looking west. Most of the buildings at this end of the street are occupied by doctors and dentists, or by leading clubs.



Melbourne's century-old Botanic Gardens contain 100 acres of shrubs, trees and flowers in a delightful landscaped setting of lawns and ornamental lakes. Seen here are some Australian eucalyptus trees.

capital, Hobart, is unlike any of the other cities of the Commonwealth. It is a pleasant town—solid, modest and unpretentious, almost buried in orchards. It rises from the estuary of the River Derwent against a succession of slopes of Mount Wellington, whose summit, some 4,000 feet above sea-level, remains snow-covered for many months of the year.





The northern suburban area of Hobart, with snow-capped Mount Wellington (over 4,000 feet high) rising in the background. This city is the second oldest in Australia, having been founded in 1804.

Hobart has the intimate character of an English county town and, when viewed from one of the hills or from the turreted, castle-like Government House which overlooks the estuary, awakens vivid recollections of Devon or the Kentish countryside, so typically English is the scene—which even the presence of some modern factories, of not unattractive design, cannot blur. Alongside the willow-bordered banks of the Derwent curves the road, lined with hawthorn bushes and brambles and blackberries. Past old-fashioned cottage gardens where wall-flowers, mignonette and sweet-williams grow,

through hopfields and meadows shaded by spreading elms and strewn with buttercups and daisies, the river flows leisurely—a pastoral idyll.

In Adelaide, capital of South Australia, the atmosphere is academic, as becomes a university city. Between St. Vincent Gulf and the Mount Lofty ranges, among fruitful plains, wheat fields and vineyards, lies the city which was planned on paper long before the first stone was laid. Adelaide from the beginning was designed to be a city unlike any other. This becomes evident the



Hobart, gateway to the island state of Tasmania, stretches along the rolling hills on the shores of the Derwent Estuary, and its harbour provides anchorage for ships from all over the world.

E. O. Hoppé

A view of Government House and north Adelaide, as seen from the North Terrace. The capital of South Australia, with its abundance of parkland, provides a fine example of careful town planning.



moment one enters her portals by way of the railway terminus, which has the quiet and majesty of a cathedral rather than the bustle and noise of a station. Adelaide is the nearest approach to the ideal city, and could well serve as a model to town-planners in general.

There is an exquisite view of the capital from the summit of the Mount Lofty range of mountains, whose slopes lose themselves in the graceful sweep of parkland which completely encircles the square mile of the business blocks of the town.

The River Torrens has been dammed to

form an artificial lake (its banks flanked by well-tended gardens) which divides this business section from the residential parts that lie beyond the belt of nine and a half miles of greenery. The whole is not the result of accident but of deliberate planning on the part of one man who, in 1836, was given authority to do what probably no other human being had ever accomplished before: namely, to lay out and build a city according to his own judgement. Colonel Light, upon whom this duty devolved, carried out his task brilliantly. Proud, beautiful and cultured, Adelaide is the oldest and at the

Adelaide's pleasant and shady North Terrace, flanked on the left by the National Gallery, university and other cultural buildings and the War Memorial, and on the right by business offices.





same time the most modern municipality in Australia.

Smaller than the other capitals, excepting Hobart, Perth, the youngest of the cities, has had to live down her reputation; the

In the pleasant grounds of Adelaide's university, students can study or eat their lunches in ideal surroundings.

triumph of Western Australia's capital is typified by the name of the river on which the town stands as well as by her motto, "Cygnis Insignis". In the early stages of her history, superficial judgement condemned her as waterless and unprofitable, though there was water in plenty for the seeking, and gold for the finding.

Looking at Perth and her port of Fremantle today, it is difficult to believe that the first immigrant ship arrived at the latter port as recently as 1829. Hundreds of travellers have their first sight of Australia at this point, as they come by way of the Suez Canal and Indian Ocean. For many years Perth remained little more than a small village and it might, indeed, never have risen out of the quagmire of inertia to be a fine city worthy of a beautiful setting had it not been for the discovery of gold in the 'nineties, which brought prosperity in its wake.

In 1889 someone started a water-service from the Darling ranges; this was taken over by the Government in 1896, and when, a few years later, Western Australia's important lumber towns, Albany and Bunbury, linked up with Perth by rail, the weight of depression was lifted. The opening of the transcontinental railway has since firmly established Perth's importance as one of Australia's capitals and made it the gate-



The railway terminus at Adelaide "has the quiet and majesty of a cathedral rather than the bustle and noise of a station". It stands on the bank of the River Torrens, which has been dammed to form an artificial lake and surrounded by gardens.



Perth, as seen from King's Park, looking across the Swan River. The capital of Western Australia was founded in 1829 and called after the ancient capital of Scotland by its first Governor, Sir James Stirling.

E. O. Hoppé

way to the gold areas in the east of the State, the rich wheat belt in the north, and the valuable hardwood forests in the south.

Architecturally the town is not particularly exciting, but its situation is enchanting. It spreads on both sides of the Swan River which, in front of the city, broadens into a most attractive lake—known as Perth Water and dotted with small yachts. A fine esplanade borders the waterfront and countless red-roofed bungalows are enfolded in a luxuriance of vegetation. But the city's unique feature is the exceedingly fine stretch of country known as King's Park; this connects Fremantle and Perth by as interesting an avenue as one may wish to meet, in which 1,000 acres of native bush, presenting all the natural characteristics of the Western Australian landscape, have been wisely preserved.

Wellington Street, Perth, with a large department store on one side and a line of shady palms on the other.

From the moment one sets foot in Brisbane, capital of Queensland, the urge to seek for adventure seems to get hold of one. It may be that the sight of ships from West and East that lie in the wharves stir the





Framed by the branches of a Moreton Bay fig tree, Brisbane's City Hall tower dominates this view, as seen from Observatory Hill. The capital of Queensland (Australia's tropic state) has a daily average of nearly eight hours of sunshine.

imagination, their funnels rising in the heart of the city, at the very doors of smart shops and big warehouses stocked with treasures transferred from holds whose yawning mouths are ready to take the produce of the Commonwealth back to greyer shores. Perhaps the fact that this gateway to the tropics is also the gateway to Unknown Australia is responsible for making one feel so strongly the call of the lands beyond the mountain-barrier which divides the coastal stretch from the vast plains of the northern regions.

In outward appearance Brisbane is reminiscent of some of the towns of the West Indies. Amidst luxurious vegetation one-story weather-boarded homes climb encircling hills, perched, for the sake of coolness, high on stilts, while others meet the lake-like reaches of the river. Masses of white-starred jasmine, rich purple and delicate mauve blossoms of bougainvillea, the vivid apple-green of banana leaves, lacy fronds of sleek-columned palm-trees, flamboyant clusters of poinciana, combine in a tapestry of glowing colour. Fragrant scent hovers in the air and even the conglomerate aroma of the business section does not wholly succeed in drowning it.

In the commercial centre of the city, utilitarianism is combined with civic dignity. The wide thoroughfares are flanked by tall, modern office blocks, municipal buildings and hotels, interspersed with trees

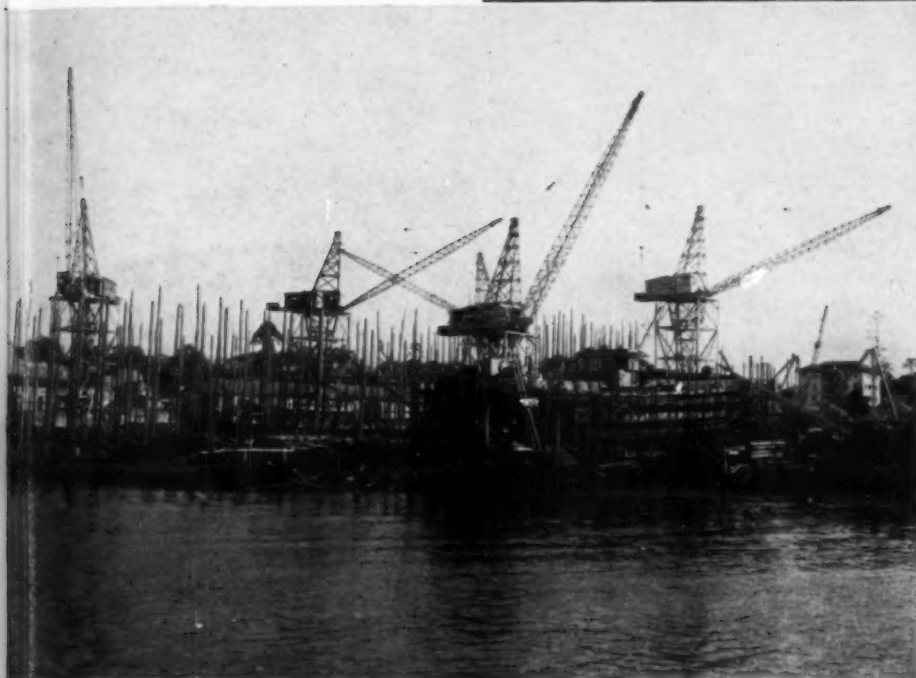
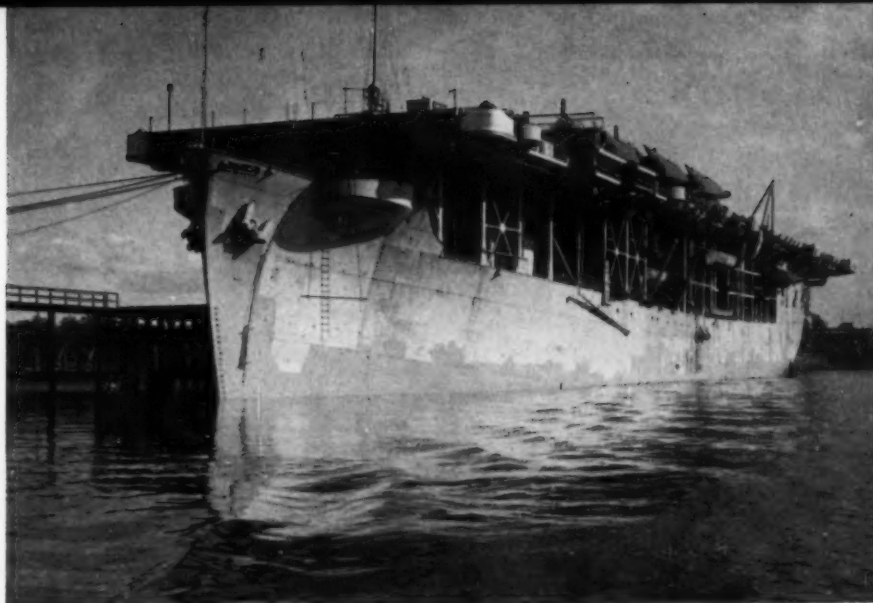
and ornamental gardens which add to the pleasant aspect of the streets. Family cars and the latest sports models are parked on one side and crowds of well-dressed women and prosperous-looking men saunter along the colonnaded foot-paths in front of the stores and luxury shops.

However diverse opinion may be regarding the merits or shortcomings of Canberra as the civic centre of Australian national life, no one can doubt that the deliberate setting out to wrest from the wilderness a great capital city, designed to express a nation's attitude to life, was a courageous gesture that only the enthusiasm of youth could have conceived.

Kings and conquerors in ancient history have erected monuments to celebrate a personal triumph or satisfy a religious impulse, but these were usually planned in a setting of already existing cities or, at least, placed within easy reach of the centre of national activities. The site of Canberra, on the contrary, is about 400 miles from Melbourne, 200 from Sydney, and 100 from the coast, in a sparsely populated country. But the site was well chosen, and the architectural layout, designed by Walter Burley Griffin of Chicago, fits well into the amphitheatre of wooded foot-hills which encircle it.

American influence is evident in the architectural style, yet there is no erection of skyscraper-like proportions. The massive

Lying twelve miles from the mouth of the Brisbane River, Brisbane itself is easy of access to the sea, and ships of 20,000 tons and over can come right up to the heart of the city. Seen here is an aircraft carrier at anchor in the river.



A section of the ship-building yards of Evans Deakin Limited at Kangaroo Point, Brisbane River. Ships ranging from 100 to 10,000 tons are built here

Wharves and shipping at South Brisbane Reach. Brisbane is the principal port for Queensland's vast primary producing area of nearly 700,000 square miles, which contains 6,500,000 head of cattle, 23,000,000 sheep and 134,000,000 acres of cultivated land.





Canberra, Federal Capital of Australia, is a garden city, rich in native and exotic shrubs and trees. Outside the city post office may be seen Arizona cypress (left) and incense cedar, both imported from the United States.

buildings are low and cover considerable ground, a fitting arrangement in a country where spaciousness is the dominating characteristic and where a sparse population removes any necessity to economize on ground space.

At a conference of Premiers held in Melbourne at the turn of the century to discuss plans for a new Capital, it was determined that the ownership of the city should be vested in the Commonwealth, that its territory must contain not less than 100 square miles, and also that its distance from Sydney should not exceed 100 miles.

Definite steps to investigate the potentialities of different sites were taken three years later and several promising places were visited. Then followed the "battle of the sites", during which public feeling ran high, while parliamentary controversy was bitter and prolonged. After an extensive ballot,

however, approbation was bestowed on Canberra and in 1911 the Commonwealth Government invited designs for the proposed Capital.

The outbreak of World War I delayed development plans, and the temporary Parliament House was barely completed in time for its opening by the Duke of York, later King George VI, in 1927. By the time the King's brother, the Duke of Gloucester, took office there as Governor-General of Australia, Canberra had grown into a handsome garden-city.

Millions of trees and shrubs have been imported from various parts of the world and planted to embellish miles of broad avenues and curving drives which radiate from the massive group of civic buildings, and act as an effective foil to their dazzling whiteness.

Each public building stands in its own

framework of gardens and parkland. To Parliament House, occupying 168 acres, about 17,000 trees and shrubs have been allotted, and a similar prodigality of flowers is in evidence at its great entrance. The old stone mansion, some eight miles from Canberra, that was originally the homestead of the Campbell family, must feel a little strange in its new, super-luxurious setting, and its elevation to the dignity of Government House. Only the outer shell of the old mansion remains, and something of the warm human atmosphere of the original interior has departed with the alterations necessary to suit more formal usage. It is precisely this note of emptiness that mars the cold white beauty of Canberra. Symmetry is there, simplicity of design also, and there is nothing to offend the aesthetic sense; but the soul of the Australian people has yet to enter and vitalize

this civic Galatea. Only time and human contacts can achieve the transformation. The audacious venture has, however, proved a triumphant vindication of the bold theory manifested in its primary conception: that the capital of a great nation need not necessarily enclose and embody the gradual development of civic dignity, but can successfully draw into itself the pulsating heart of the rich outpouring of human experience that contributes to the building up of a great and unified country.

No factories, no railways, break the silence of Canberra; no grime or smoke mars its spotless whiteness. And the houses, mostly bungalows, forming the residential part of the city, have the same air of meticulous attention about them—as though their owners are perpetually aware of the responsibilities of living in a city planned to epitomize the ideals of a nation.

An aerial view of Canberra's Parliament House, which was begun in 1923 and finished in 1927 at a cost of £600,000, the first Commonwealth Parliament being opened there on May 9, 1927, by the Duke of York (later King George VI).





THE CANADIAN GEOGRAPHICAL SOCIETY'S NATIONAL SCHOLARSHIPS IN GEOGRAPHY

At a meeting of the Board of Directors of The Canadian Geographical Society held on December 19, 1951, it was unanimously decided to enlarge the scope of its scholarship program and to put it on a national basis as befitting a national society.

It was the feeling of the Board that the geographical scholarships of the Society should be granted to students rather than to institutions. Although scholarships have in the past been granted to the University of Toronto (1939 to 1942) and to the McGill Geography Summer School (1948 to 1951), the Society now believes that, taking cognizance of the fact that geography is being taught at several other centres, it would be only proper to extend its support to schools of geography with appropriate curricula and facilities.

The Society is prepared to award four* scholarships of \$250.00 each for study in Canada during 1952. This number falls short of the number of universities offering geography, and the Society regrets that it cannot provide scholarships at every geographical centre.

Consequently, the Board of Directors agreed that the grants should be made to the four most worthy students and that they should be tenable at any school or department of geography across Canada.

A Scholarship Committee was set up under the Chairmanship of Dr. B. R. MacKay, to draw up the conditions of award of the scholarships and to select the students for recommendation to the Board.

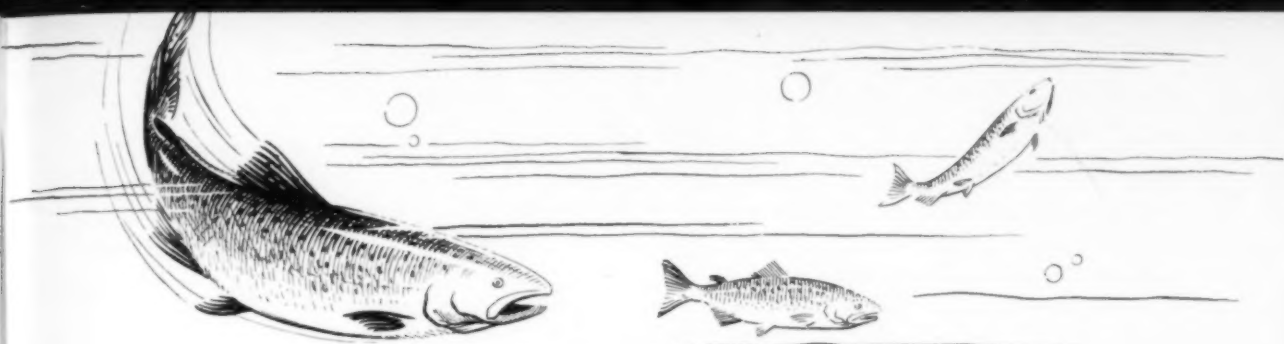
The conditions of the award are as follows:

1. The applicant must be a Canadian or a student studying for a degree or diploma in Canada;
2. The applicant must be registered for a course leading to a degree in geography; or for a diploma in education in which geography is a required subject;
3. The applicant must be able to demonstrate outstanding academic ability or experience in teaching geography. Field experience will also be taken into account in assessing the candidate;
4. The scholarships may be held in the last year of undergraduate work or during post-graduate work;
5. The scholarships may be tenable during either summer or winter sessions beginning in July or September, 1952;
6. The successful applicant may study at any university in which there is a school of geography. For 1952 the institutions giving degree courses in geography are:

The University of British Columbia,
Laval University,
The University of Manitoba,
McGill University,
McGill University Geography Summer School,
McMaster University,
The University of Montreal,
The University of Toronto,
The University of Western Ontario.

Applications should be in the hands of the Executive Secretary of The Canadian Geographical Society, 36 Elgin Street, Ottawa, by April 30, 1952. Application forms may be obtained from the Executive Secretary of The Canadian Geographical Society or from the Heads of Geography Departments in the above universities, or from Provincial Directors of Education.

*At a meeting of the Board held on February 20, 1952, it was decided to increase the number of scholarships to six for the current year.



Canada's PACIFIC SALMON

by RODERICK L. HAIG-BROWN

THE SALMONS ARE, perhaps, the most exciting of the world's fish. They are fish of grace and beauty, strong and swift and bold; and they are creatures of mysterious comings and goings, now lost beyond knowledge in the ocean depths, now lying in full daylight in the shallows of some little stream, open to sight of the most casual passer-by. Under natural conditions they are prolific fish, multiplying to abundance; they grow to great size and their flesh is rich yet delicate enough for epicures; and their predictable but always dramatic return to fresh water to spawn brings the wealth of the sea within reach of the waiting land dwellers.

Though the Atlantic salmon has been known to civilized man for two or three thousand years and the Pacific salmon only for two or three hundred, there is good reason to reckon the Pacific Ocean the true home of the salmon. Here there are five species, not one, all in fabulous abundance, ranging the coastline and ascending the rivers through most months of the year. And the heart of the abundance, the very centre of the Pacific salmon's range, is British Columbia.

It is not surprising that salmon should have established themselves in such variety and abundance along the north Pacific Coast. It is a coast of heavy rainfall, high mountains and innumerable streams and lakes and rivers. The snow and glaciers of

the mountains and the timbered slopes and valleys hold moisture and feed it gradually to the streams, so that there is always water to draw the salmon and nurse the eggs and fry. The long coastline, protected by islands, deeply cut by inlets, washed by cool currents, swarms with herrings and needlefish and shrimps, and makes a perfect ocean feeding area. Such a combination in the northern hemisphere yields salmon as naturally as the waving miles of prairie grasses once yielded buffalo.

The Five Salmons

British Columbia's five species of salmon belong to a single race, distinct from that of the Atlantic salmon and the true trouts, but grouped within the same general family. Each of the five species has several common names, which can be extremely confusing; but the industry has tried with some success to establish the use of only one popular name for each, and the chosen five, with their proper names following, are: sockeye (*nerka*), pink (*gorbuscha*), coho (*kisutch*), chum (*keta*), and spring (*tschawytscha*). The name of the race, which should stand before each of the specific names in parentheses, is *Oncorhynchus*. And the awkward, though attractive, sound of these formal Latin names is due to the fact that the Pacific salmon were first classified on the other side of the Pacific, by two Russian scientists.

These five species of salmon differ considerably, in size, in habits, in the time of their returns to fresh water, and in commercial quality. Commercially, the sockeye is the most famous because its flesh is very red, very rich in oil, and holds both colour and flavour well under all conditions of storage. It is the fish on which the salmon canning industry of the Pacific Coast was built, and it is especially the fish of British Columbia and the great Fraser River, just as the spring (or the chinook as he is called down there), is the fish of the Columbia River.

Sockeye Salmon

With the colour and quality of its flesh, the sockeye's obvious peculiarities are that it rarely ascends a stream or river system without lakes, and it takes a lure in salt water far less frequently than do the other species. These three facts are quite closely related to a third fact, which controls most of the sockeye's life history: throughout its life the fish feeds almost entirely on shrimps and other small, hard-shelled creatures, instead of on small fish as the other salmons mostly do.

Sockeyes usually spawn in small tributary streams above lakes. The young hatch from the eggs the following spring and drop back down to the lakes. In the lakes they find their first crustacean food in quantity, tiny water fleas called *Daphnia pulex*. For one or two years, occasionally longer, they stay in the lakes and feed in deep water on *Daphnia* and other tiny food. Then, as neat little fish three or four inches long, with olive-green backs and silvery bellies, they swim down to the sea.

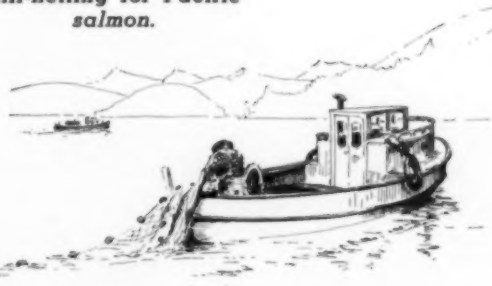
For the next two or three years they live and grow in salt water, straying far from their rivers and feeding mainly on certain shrimps that are very abundant along the coastline. They grow rapidly and become handsome fish, brilliantly silver for the most part, but with blue-green backs that are faintly speckled here and there with black. At four years of age, after three summers in the sea, most of the Fraser River sockeyes weigh five to seven pounds and are ready to

return to their rivers and spawn. Some will be older, five or six years instead of four. But most of the Fraser River fish return at four years, and they are very even in size.

The great migration comes down on both sides of Vancouver Island from the north, through Johnstone Strait and Seymour Narrows on the east side, by Swiftsure Bank and the Straits of Juan da Fuca from the west. American and Canadian net fishermen await their coming, out by the banks and along the straits and in the river itself. And the fish that pass the nets spread out through the enormous and complex length of the Fraser. Generally speaking, those that come first travel farthest; the Stuart Lake fish start the run in July and early August, then the Bowron Lake fish come in and after them the Chilko and Nechako runs, still mainly in August and early September; great numbers of late-running fish come in September and October to the Shuswap Lakes, and others to Anderson Lake, Seton Lake and the lower tributaries of the big river.

The fish caught by the nets are still silver and clean. As the others pass up the river and nearer to their spawning they change in shape and colour. The blue-green back becomes red except for a pale green on the head and gill-covers; the silver sides are still darker red, the clean white belly is now a blotched and dirty white. The bodies of the fish grow narrower and deeper, the heads of the males become long, the jaws hooked, the fins ragged; and the red sides are slashed by scars. So they reach their spawning grounds, scour nests, shed their eggs and die — their own cycle lived out, the start of a new one already living deep in the washed gravel.

Gill-netting for Pacific salmon.



This four-year cycle of the Fraser fish, one year in the freshwater lake, three years in the salt water, spawn and die, sets the pattern of the river's sockeye runs; but roughly a third of the fish vary from it. Most of these come back as five-year-olds, after an extra year in the sea or, more rarely, an extra year in fresh water. A few are younger fish that went to sea as soon as they were hatched.

In most of the other British Columbia rivers that support big runs of sockeyes, four-year-olds are also in the majority and set the cycle; but the five-year-olds steadily increase in the more northerly streams and finally, in the Nass River which is farthest north, become more numerous than the four-year-olds. This progression continues into Alaska, not only among the sockeyes but in all the other species except the pink; in the Karluk River five-year-olds make up most of the run, with six-year-olds in significant numbers and even a few seven- and eight-year fish.

Pink Salmon

If the sockeye has the most complicated and varied life history of all the Pacific salmons, the little pink salmon has the simplest and least variable. Pink salmon run in great numbers in alternate years. They seldom go very far from salt water to spawn and they always spawn as two-year-olds. When the eggs hatch the tiny fish are already silvery, without the spots and parr-marks of other salmon fry, and they go straight down to the sea, so that the whole two year life is spent in saltwater feeding and rapid growth. Most mature pinks weigh four or five pounds and a few grow to as much as ten pounds. In salt water they are handsome fish, with blue backs and silver sides and heavy oval spots on the tail and upper body. In fresh water they quickly put on the black or reddish spawning colours, and the males develop enormous bony humps on their backs.

Coho Salmon

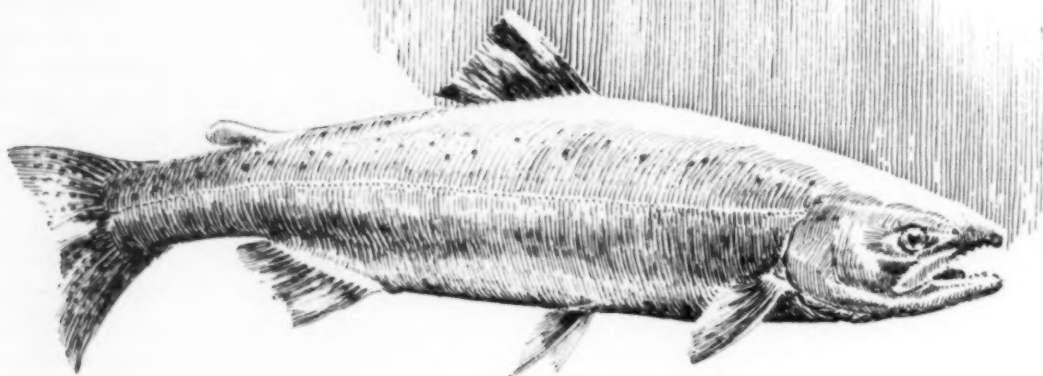
The coho salmon is a creek fish — he loves to swim boldly up the smallest streams, pushing his way over shallows, splattering

over beaver dams, twisting under logs, until he comes to the spawning ground of his choice. After the pink, his is probably the simplest and most consistent life history — one year in the nursing stream, two years in salt water. A few spend three years in salt water, but these are unusual fish. The fry are brown-backed, with bright orange fins, very handsome, active little fish when seen in the bright waters of a narrow stream. In salt water cohos probably do not migrate as far as most of the salmons. They spend their first year feeding on shrimps, but turn sharply to herrings and needlefish in the second year and make very rapid growth — from two or three pounds in March to ten or fifteen pounds when they run to spawn in October.

The coho is a swift, bold and silvery fish, a surface lover and a magnificent jumper. In the river he turns scarlet and grows a hooked jaw, but seems to hold vigour and shapeliness longer than the other salmons. Spawned-out cohos are sometimes still alive in February, long after the other salmon have died and been washed downstream.

Chum Salmon

The chum is the last of the Pacific salmon to run to the rivers, going up to spawn in late October and November. In the salt water he is steel-blue and silver, with only a few light specklings of black on his back; at his best he is much like a sockeye in appearance, though with a more slender "wrist" above the tail. Like other late running salmon, he usually does not go far from salt water before settling to spawn, though some of the Yukon chums travel upstream for two thousand miles. He deteriorates rapidly in fresh water, turning black and red with brightly mottled bars on his sides and developing fierce teeth. Like the coho, the chum usually weighs between eight and fifteen pounds at maturity, but occasionally weighs as much as thirty pounds. Most chums are three or four years old at spawning, though a fair number of the Yukon fish are five-year-olds. The young fish go down to sea very soon after hatching, though not so quickly as do the



The spring salmon, a powerfully built fish.

young pinks. They are green-backed, silvery little fish, with only faint parr-markings.

Spring Salmon

The spring is the largest of the salmons, with a life history almost as complicated as that of the sockeye. The name "spring" is in a sense accurate, because in some favoured rivers this fish does run in spring time, ahead of all the other salmons. In the Columbia the peak of the early run passes through the estuary in April, but fish continue to run in good numbers through May. Then there is a summer run in June and July and a fall run in August and September. As with sockeyes, the early fish are generally those going farthest upstream, and the late fish spawn within a comparatively short distance of salt water.

Most young spring salmon go down to salt water very soon after hatching, but a considerable number (perhaps 20 per cent of the total) spend one full year in the stream. Their age at spawning varies greatly, not only between different rivers but in a single river. The commonest return in southern streams is probably after four years of ocean feeding; the fry that went straight down to sea return as four-year-olds, those

that spent a year in the river return as five-year-olds. But three-year-old and six-year-old fish are not uncommon, and some rivers have runs of very large fish that have all spent five or more years in salt water. In the Yukon River all young springs spend at least one year in fresh water, and the females of the spawning run are usually six or seven years old, the males five or six.

A big spring salmon is a deeply and powerfully built fish. His back is dark, often almost black, and heavily spotted, as are his upper sides and tail. Fresh from deep water feeding, he can be beautifully silver, with a greenish-blue on his back that seems wholly of the ocean depths. But away from deep water he darkens quickly and often develops a rusty reddishness about his fins and belly even before he has reached his river. He feeds fiercely in salt water, mainly on herrings and needlefish, though with some attention also to shrimps, and grows very rapidly, especially in the last year. Fish that are running to spawn after four years of sea feeding average from twenty to twenty-five pounds; runs made up of five-year sea feeders commonly average forty pounds in weight, with individuals

weighing up to sixty pounds. There are authentic records of spring salmon weighing well over a hundred pounds, including one enormous fish of a hundred and twenty-five pounds.

Spawning and Migration

Such, in outline, are the salmon that come yearly in complex abundance to the rivers and streams of British Columbia. Their comings and goings have been studied with steadily increasing intensity for some fifty years now and much is known of them, though the ultimate mechanics of migration are still matters of theory. Salmon lay their eggs deep in the gravel. The female turns on her side and fans violently with her tail until, aided by the current, she has scooped a nest that may be sixteen or eighteen inches deep. She does this carefully and thoroughly, testing the depth by settling her body into it

until she is satisfied. Then, with the male beside her, she expels some eggs. Briefly they remain clustered while the fertilizing milt of the male clouds over them, held in the hollow by the action of the current. Then the eggs separate, drifting down into crevices in the gravel. The female covers them, usually digging out a second nest as she does so. And the whole process will be repeated several times before spawning is complete.

Down under the gravel the eggs are very safe. They are safe, in fact, from everything except the action of the streams; very high water may silt them over and choke them, or may scour them out and scatter them down in the current; very low water may leave them high and dry. But generally the rivers take care of their own and in three or four months, at normal winter temperatures, the eggs begin to hatch.

The sockeye salmon are handsome fish.



T. Brayshaw.

The little fish remain in the gravel until they have absorbed a good part of the yolks that hang from their bellies, then begin to work towards the surface of the stream bed. Up to this point the protection has been almost perfect, and close research has shown that losses from a female's natural spawning of from two to eight thousand eggs are negligible. But as soon as the little fish work free from the gravel, they are exposed to every kind of attack. From a hundred million eggs, safely hatched, not more than two or three million young salmon are likely to reach salt water.

When the fish are ready to migrate, whether as newly emerged fry, as three-inch yearlings or still larger two-year-olds, their movement is positive and usually massed. They swim down with the stream, often pausing to rest in eddies or other sheltered places, but apparently driven by some force similar to the one that will bring them back, years later, to climb against the same river currents to their spawning. What this force is, no one exactly knows; it is probably a combination of several factors, some inside, some outside the fish itself. The temperature of the water is one clear and definite factor; young sockeyes, for instance, normally migrate on a rise in temperature that brings the water to approximately 40 degrees Fahrenheit. Excessively high temperatures stop migration. And the size of the fish is a factor — exceptionally small fish delay migration. Recently it has been found that the silvery coating that comes on a migrant's scales is an essential protection in the change from fresh to salt water. It almost certainly is the outward and visible sign of a sharp physiological change in the fish which, in its turn, may well be the most significant factor in setting the time of the migration.

Whatever its mechanics, the migration brings the young salmon down the rivers, through the estuaries and out into salt water. From this point on it would seem that their life and movements are largely controlled by the search for food, though

water temperatures may also have their effect.

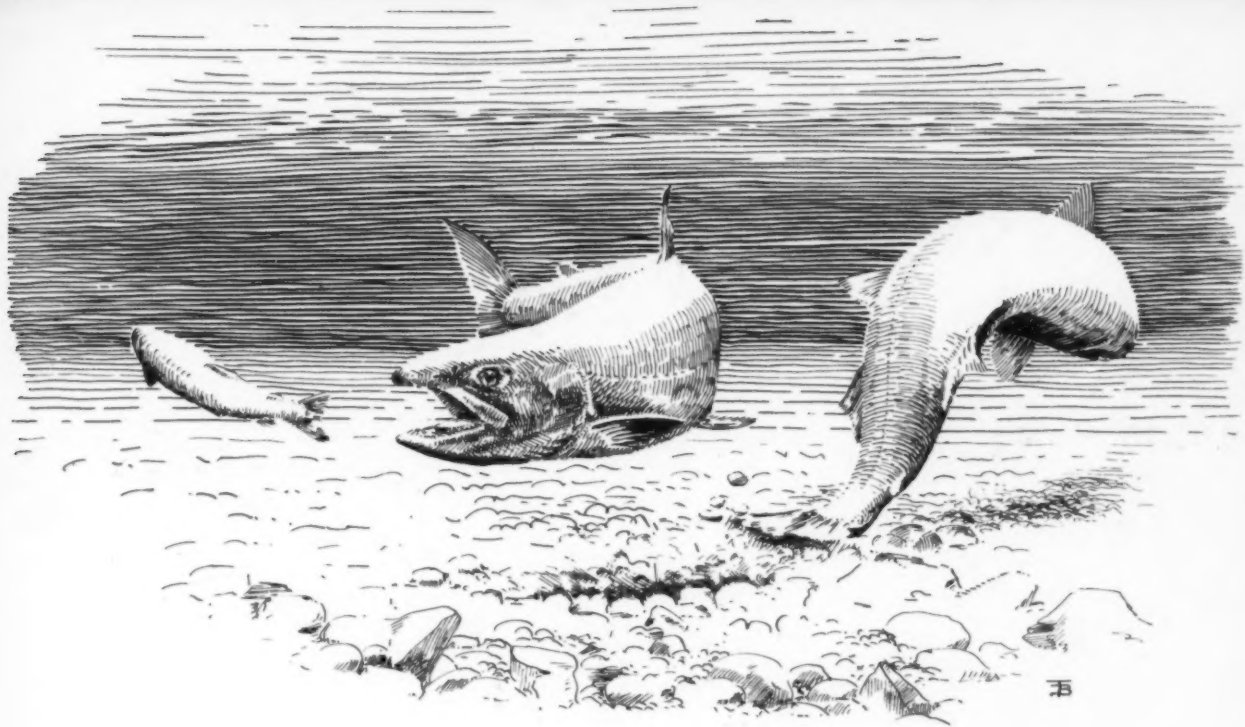
Saltwater Life and Feeding

The general set of the currents along the northern Pacific Coast tends, in sum, towards the north. The myriads of tiny organisms that make up the ocean plankton drift in this current. Larger creatures, such as herrings and needlefish and the euphausiid shrimps, feeding on the plankton, drift or swim with it. Still larger creatures, such as the salmon, follow these to feed on them.

Because they feed very actively and extensively on bright little fish like herrings and needlefish and pilchards, the spring and coho salmons readily take a flashing lure trolled through the water behind a boat. An important fishery has been built around this and the troll fishermen follow the springs and cohos through a good part of their saltwater lives, so that their movements in the sea are better understood than those of the other salmons.

During the first year or so after leaving their rivers, both cohos and spring salmon feed mainly on what is known as the "red feed", concentrations of a very abundant euphausiid shrimp, properly known as *Thysanoessa spinifera*. This is also the main food of the sockeye throughout its saltwater life and probably of the pink as well, though the pink salmon, like the coho, turns to feeding quite freely on other fish during its second saltwater year.

Both spring and coho, and probably the other salmons as well, seem to spend their sea lives along the limits of the continental shelf — that is, somewhere between the shore-line and the "hundred-fathom line", a point beyond which the bottom drops rather sharply down towards the great depths of the ocean proper. The distance off-shore of this hundred-fathom line varies greatly, but it averages about thirty-five miles; and it is reasonable to suppose that the fish keep within it, not because of any dislike of extreme depths, but because the life they feed on thrives best in the shallower water. Spring salmon have been caught at a depth of well over five hundred feet, but a more



The spawning female turns on her side, fanning violently with her tail to scoop out a nest.

normal feeding depth is probably about two hundred feet. And at dawn and dusk they are likely to be quite close to the surface, as they are whenever the herring or needle-fish schools are well up in the water.

Many of the cohos, who after all have only two short years to spend in the sea, make a short migration; numbers from the southern rivers of the province live out their whole time in the Gulf of Georgia, where they are first caught commercially in June of their third year, as fish of three to five pounds, with flesh as rich and red as that of the sockeye, probably from crustacean feeding. They have by that time turned to feeding on other fish and they continue to do so until they run to spawn in the fall of the same year. But some cohos do make long migrations — one fish marked near the Queen Charlotte Islands was caught eighty-three days later in a trap off Whidby Island, in Puget Sound.

Pink salmon, having a similarly limited time in salt water, and being smaller and younger both when they arrive there and when they return to spawn, probably do not

as a rule go far. But two pinks have the distinction of being the only salmon in history to be marked as fry before leaving fresh water, caught in salt water, marked again, and recaptured on their return to spawn in the stream of their birth. Both these fish were hatched in Morrison Creek, a small tributary of a small Vancouver Island stream. One was caught and tagged in the sea forty-five miles north of the stream on August 19th; the other one hundred and fifteen miles south on August 30th. Both reached the counting fence at Morrison Creek on October 6th, as faithful and dramatic a return from wandering as could well be asked for.

But the spring salmon, having both the strength and the time, is the greatest traveller of all. Fish marked off the north coast of the Queen Charlotte Islands have been commonly recovered in the Columbia River, some seven hundred miles south, in less than a month. This, of course, is on the return journey, when the fish are on their spawning migration.

The mechanics of this return journey,



Nearing spawning time the sockeye changes shape and colour.

like those of the seaward movement, are not fully understood. All the salmon undergo important physical changes as they approach maturity — the development of roe and milt alone is a major change — and it seems probable that a glandular disturbance of some kind provides the final stimulus that turns the fish back to his parent stream. It is clear that they feel a strong urge to swim against the current, even to the point of turning to swim for a while in the wrong direction in the confusion of tide and river current in an estuary. Beyond that, there is little to be said. Clearly the precise degree of maturity is not the important factor — some salmon return to their rivers in April or May and wait until August or September to spawn; others come in from

salt water late in the year and spawn almost immediately.

It is abundantly clear, both from the results of marking salmon and from the predictable returns of runs, that the fish find their way not merely to their own river system, but to a particular branch of it and to the particular tributary of that branch in which their parents spawned and they themselves hatched from the gravel. Many experiments have been made, attempting to show that water temperatures or chemical content or some other recognizable character of the particular stream is the drawing influence, but the thing remains a mystery. The only certainty is that under normal conditions the salmon do come back to where they started from.

The Industry

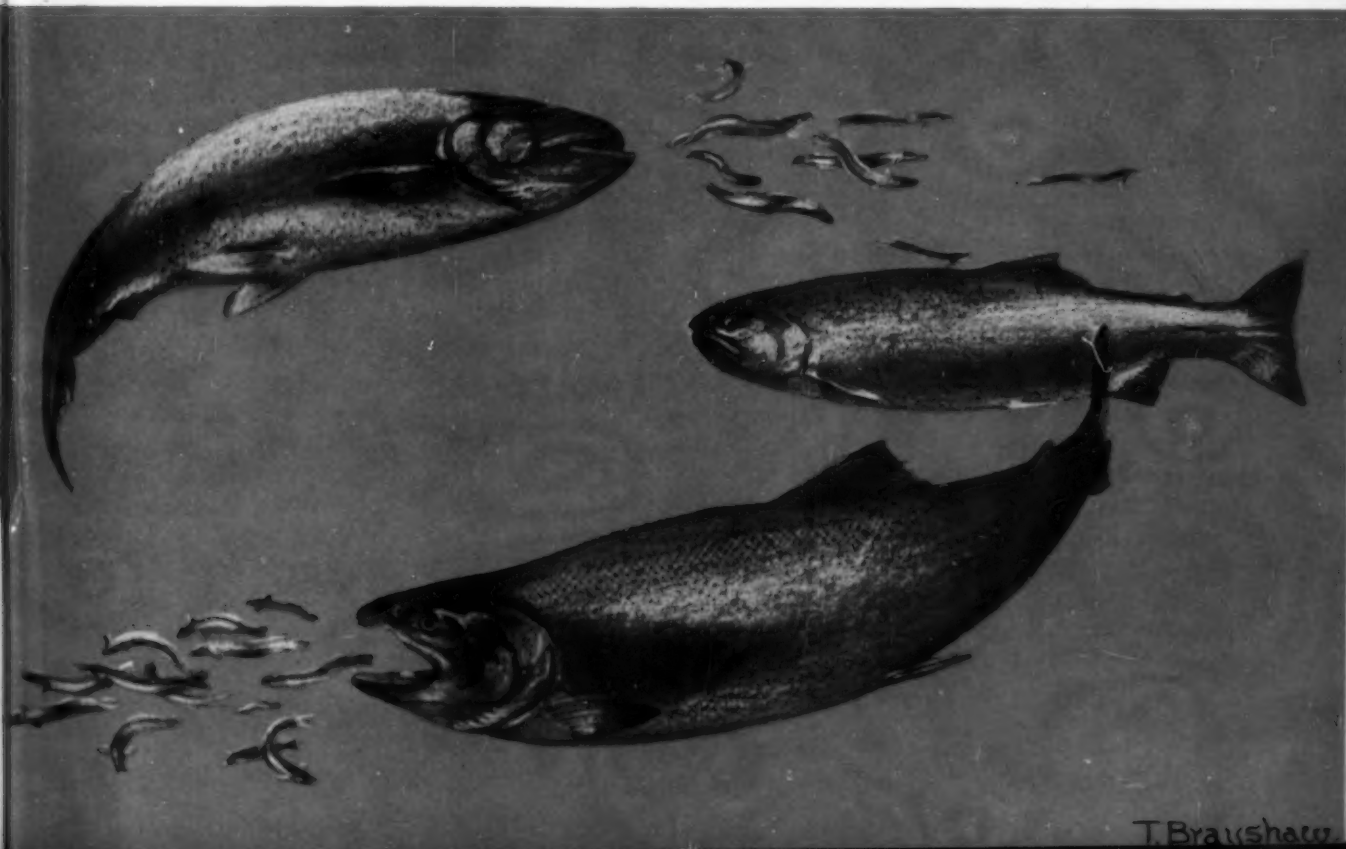
Until about a hundred years ago the salmon of the Pacific returned to streams in natural state and faced no serious hazards except natural ones. Undoubtedly these occasionally caused heavy losses; floods, droughts and slides must from time to time have affected streams and temporarily reduced runs; there may have been cataclysms at sea, submarine upheavals or local failure of special food sources perhaps, to cause damage. But the normal conditions were almost perfect, the five species were prolific enough to restore themselves, and the only unnatural interference was that of the Indians, who fished for food and trade.

The Indians had many ingenious fishing methods and took an important crop of salmon. On the Columbia they fished from large encampments, using dip-nets, spears, hook and line, haul seines, jump baskets set near falls to catch the salmon falling back, and weirs or traps. They dried the fish, smoked them or made them into

pemmican, both for their own use and for trade with tribes from other parts. It has been estimated that the Indians of the Columbia watershed may have taken as much as eighteen million pounds of fish a year.

On the Fraser there was a similar fishery and the Indians were quite dependent upon the timing of the runs. At Stuart Lake the fish were expected in the second or third week of August and by that time food supplies were always so low that the arrival of the first fish was an event of tremendous importance. An early North West Fur Company trader, Mr. D. W. Harmon, wrote in 1814: "We have had but few salmon this year. It is only every second season that they are numerous, the reason of which I am unable to assign". But there were always some fish, even in the off years, and it is fairly certain that the Indians along the river took as many as half a million fish every year. All along the coast, and far up many of the other big rivers, Indians took salmon

Coho salmon are swift, bold, and silvery fish; magnificent jumpers when taken on the fly.





An Indian method of taking salmon.

and in large measure depended on the runs. But the catch was within the safe limits of the resource and the salmon held their abundance.

When white men first came to the coast they saw the abundance of the salmon, but were faced with the problem of trying to reach distant markets. In the early years some quantities of salmon were salted and shipped out, but the first canneries on the Fraser and the Columbia were not built until 1866. On the Fraser the fish canned were sockeyes, and they were caught by gill-nets. Within a few years many canneries were operating on both sides of the border, and the commercial industry was firmly established.

Fishing Methods

Gill-nets are still the most productive and important gear used on the Fraser, and sockeyes are the chief gill-netter's fish all over the province. Gill-nets are now operated from cabin power boats about thirty feet long, with power-driven drums to bring in the nets. The nets most commonly used in the sea are a little under a quarter of a mile long, with a 6½-inch mesh, sixty meshes deep. Inside the Fraser the length is limited to nine hundred feet, and the depth to fifty meshes. The net-twine is strong, but thin, so thin as to be invisible to the fish in water that carries any silt. The net is hung from a cork-line at the surface and kept extended by a lead-line at the bottom; one end is tied

to a buoy, the other to the boat, and the fisherman drifts through a fishing period, checking his net from time to time to remove fish or debris. Most gill-nets are used inside the larger rivers or off the mouths of rivers, but at night they can be fished effectively well out in salt water if the fish are running favourably.

By 1900 fish traps were common and effective in both Washington and British Columbia. A fish trap is a permanent installation of piles and netting, extending for about half a mile across the line of the salmon's travel and leading him gradually into a heart or centre from which he can easily be taken. Traps caught enormous numbers of fish, and were abolished by law in Washington in 1935, when some eighty or ninety were in operation in Puget Sound alone. Four or five traps are still operated in British Columbia, off the south end of Vancouver Island, but they have never been numerous on the Canadian side.

The case against fish traps was that they were too destructive of fish and that they tended to limit the ownership of the industry to a few large and powerful companies. The first of these points is not altogether sound, since traps, being fixed in location, are the most predictable and the most easily controlled of all gear. The second argument touches closely the democratic concept that has always played a part in the industry — the thought that the small man, owning his own boat, shall have his chance at the fish, and so at independence. It is a good concept and an important one, though it presents conservation difficulties even today. It is obvious that an ever-increasing number of individually owned boats must have steadily decreasing individual shares in what is a fairly constant harvest. Limiting licences would undoubtedly make for greater efficiency and increased individual shares; it would make control and conservation simpler and more effective; but it would also create a privileged group in a publicly owned resource.

Both purse seines and drag seines were extensively used in early years, but use of the

purse seine developed enormously as power boats improved and now, with gill-netting and trolling, it is one of the three principal methods of the industry. The modern purse-seine is limited to two hundred and twenty fathoms in length, and must be at least two hundred and fifty three-and-half-inch meshes deep; it is a net of fairly heavy twine, supported by corks at the surface and having a purse line running through rings all along the bottom; this line is tightened to enclose fish circled by the net and prevent them diving down.

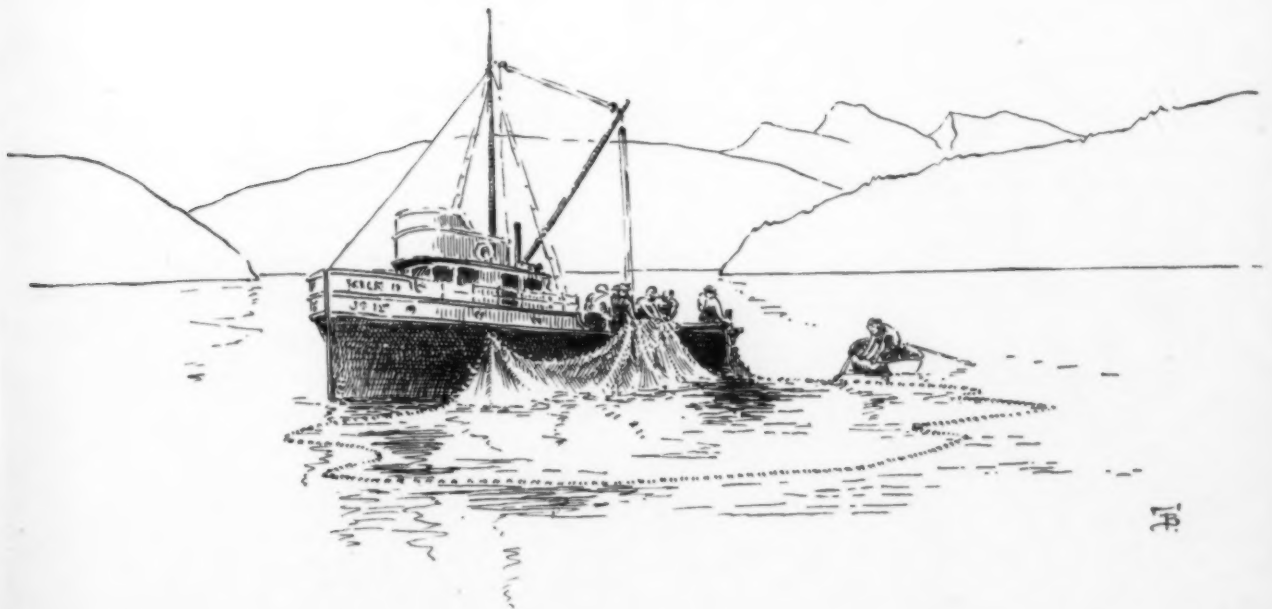
The size of purse seine boats has increased steadily over the years, and most are now forty-five to seventy-five feet long, or longer, and driven by powerful diesel motors. They carry a crew of seven men or more and cruise both inside and outside waters to find fish. When a school is spotted, by jumping fish or bubbles or some other sign, one man goes over the side in a heavy skiff and rows to hold the end of the net. The boat circles under power while the crew pays out the net. Then the purse-line is tightened and the net is drawn in until the salmon are enclosed in a narrow circle alongside the boat. From this they are brailed by a giant dip-net into the hold.

A fleet of three or four hundred purse-seine boats operates in British Columbia

waters and depends mainly on the runs of pink and chum salmon, though the sockeyes, because of their high price, can be of great importance in a big year. In one year British Columbia purse-seines caught over five million pink salmon, nearly three and a half million chums, a quarter of a million sockeyes, about the same number of cohos and only twenty thousand springs. Gill-net boats took two and a half million sockeyes, nearly two million pinks, one and three-quarter million chums, over a million cohos and a hundred and thirty-five thousand spring salmon.

The third major branch of the British Columbia salmon fishery is trolling. Trolling in its simplest form is a matter of dragging a flashing lure or a piece of herring on a hook behind a rowboat, and hoping that a salmon will strike it. Many salmon are still caught in some such simple way as this, but the all-out, professional troller has very different gear. His boat is probably forty feet long, built to ride an open ocean storm and to carry ice in the fish-holds for a week at sea. Its power will be a high-speed diesel or gasoline motor. Two tall poles rise high above the mast and two more lie back from the bow. When the boat is fishing these poles are dropped out and downwards, carrying stainless steel lines that are stretched

A purse-seiner.



almost straight down for thirty fathoms or more by forty-pound "cannon-balls" of lead. Each line carries three or four spoons, sometimes as many as seven.

Many of these "outside" or "west coast" trollers, as the better boats are usually called, are equipped with radio telephone, depth-sounding devices and automatic pilots; and when fish strike, the steel lines are reeled in on power-driven spools called "gurdeys". It is an effective form of fishing that catches two or three million salmon a year, nearly all of them springs and cohos; in one year, 1934, the trollers' catch of coho salmon alone was two and a half million out of a total of three and a half million caught by all types of gear. Trolling has a powerful appeal to men of independent mind who are fond of the sea.

Pacific Salmon as Game Fish

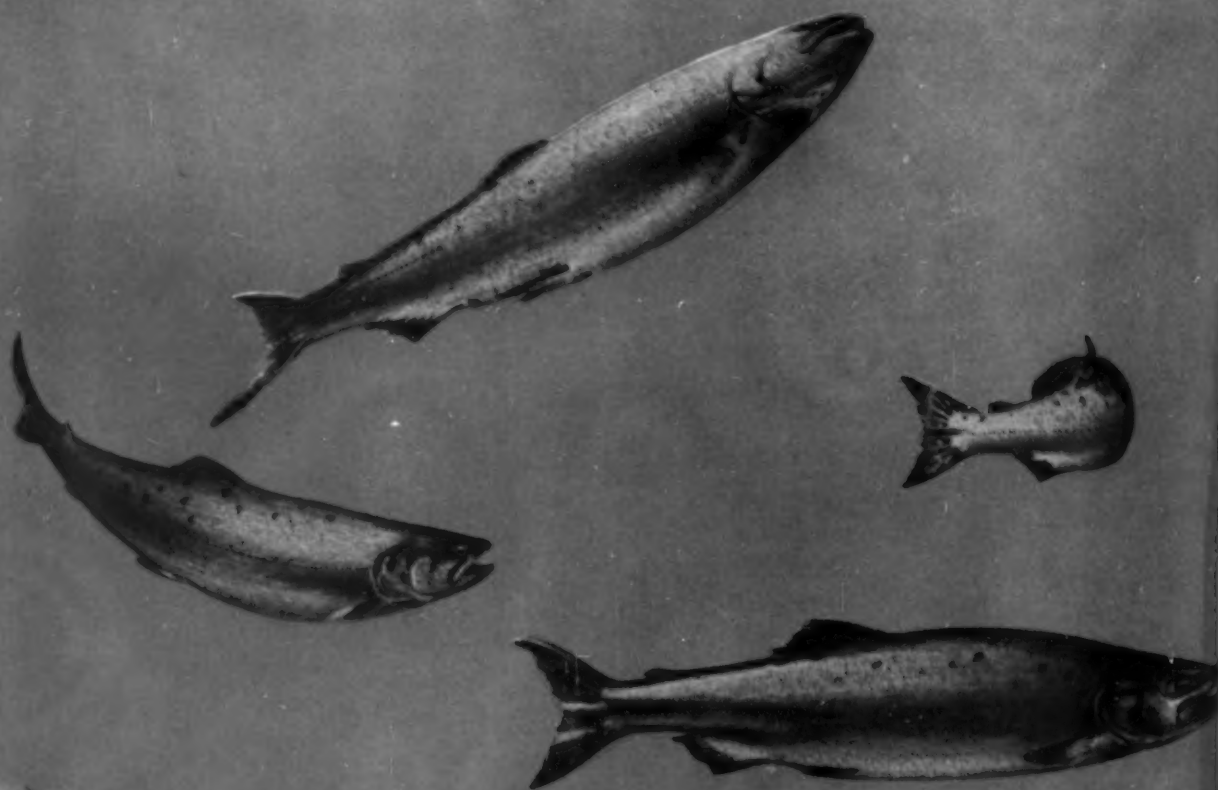
A highly important by-product of the salmon runs is the province's saltwater sport fishing. This is a by-product only in terms of fish used; its value, in terms of recreation for residents and money brought

into the province by tourists, is enormous and steadily growing.

The spring salmon and the coho are the two important game species, though pink salmon are sometimes caught in fair numbers. The sheer size of the spring salmon caught on rod and line every year at such places as Campbell River, Comox, Port Alberni, Rivers Inlet and Phillips Arm, is a challenge to anglers all over the world; it has gained the province word-of-mouth advertising worth more than all possible forms of planned publicity. Most of the fish are caught by trolling as they approach their rivers in July, August, and September. The present record is a fish of seventy-two pounds caught at Brown's Bay, Vancouver Island in 1948. But no recent year has gone by without the capture of several fish larger than sixty pounds. Forty- and fifty-pounders are common at the better known fishing places, where tackle is usually regulated by clubs and emblems are awarded for big fish.

The coho salmon offer a different and faster type of sport. They also are usually

Pink salmon, in salt water, have blue backs and silver sides.





The fighting spirit of spring and coho salmon attracts sport fishermen from all over the world

taken by trolling in salt water but since they are still actively feeding, which the springs usually are not, they will take a large fly fished just under the surface. When hooked they run fast and far and jump a great deal. Most fishermen use trout rods of five or six ounces, which give the fish every chance to show their best. Cohos will also take fly or lure after they have entered the streams, and give excellent sport in this way until they begin to lose condition.

Feeding springs and cohos are taken in good numbers at times by casting strips or plugs of fresh herring and working them up through the water. This is rightly a popular method, since the fisherman has something to do besides sit in the boat and wait for a strike. All angling waters in British Columbia are open to the public.

Processing the Catch

Limited quantities of British Columbia salmon are frozen, smoked or salted — shipments of frozen salmon run into millions of pounds and are increasing from year to year — but the canneries still put up the overwhelming bulk of the pack. All through the history of the industry canning has been the one really effective way of preserving huge quantities of fish through shipment to distant markets, and in British Columbia the number of salmon canneries increased from 2 in 1876 to 69 in 1900 and 90 in 1917. That was the peak in numbers, because the

complicated machinery improved so much that fewer canneries were able to handle a larger pack. By 1928 the number had dropped to 36. Through the thirties it held near this figure, but by 1948 only 27 canneries were operating.

Again this is not because the pack is smaller; the ninety canneries of 1917 packed one and a half million cases; thirty-six canneries in 1941 packed over two and a quarter million cases. But fast boats carrying plenty of ice can now pack salmon to the canneries over long distances in good condition, and cold storage holds fish perfectly until the canning floor is ready for them. In earlier times it was necessary to have canneries scattered all over the province, near the fishing grounds. It was costly and difficult to keep these scattered canneries supplied and often difficult to find labour for them. At the local peak of the run their capacity was over-taxed and fish were wasted; in slow periods both labour and machinery were idle and wasting. A cannery near a large centre of population finds labour easily, and if it has large cold storage facilities it can feed the fish gradually through the plant and keep a crew in steady employment through a long period. It seems likely that the isolated upcoast cannery will soon be a thing of the past, and the total of operating canneries will decrease still further.

The Harvest and the Seed

The annual value of the salmon fishery is at present close to fifty million dollars. It employs directly eighteen or twenty thousand men. And the total value of boats, plants and equipment in use is something over fifty-five million dollars. Clearly the future of the salmon is of enormous importance to the province and the nation. And inevitably there are problems.

The resource is not a simple one. It is compounded of the salmon themselves, the water of the rivers, and the sea. There must be, each year, enough salmon left over to breed the runs of future years. There must be fresh water in the rivers, in strong and steady flow, to permit the salmon to ascend and spawn, to nurse the eggs and raise the fry to migration size. There must be a clear way down to the sea for the fry, and the normal clean abundance of the sea must be waiting for them when they get there.

Only this last seems reasonably assured and even this, judged by the fate of so many resources once reckoned inexhaustible, should not be too lightly taken for granted. It has already seemed wise to investigate rather thoroughly the possible effect of the herring fishery upon the total of the salmon's food supply. Fortunately the findings were reassuring. It seems clear that, in spite of a large herring fishery, there are still plenty of herrings for the salmon and that even if there were not some other small fish would fill the gap. So also with salt water pollution. There is none yet that seems a serious threat, but it may not always be so, especially in the narrow waters of the inside channels.

So far as the fish themselves and the fresh water that breeds them are concerned, the picture is far otherwise. There have been problems, there are problems, and there will be more and more problems.

The run of salmon that survives the dangers of salt water, passes the trollers and net fishermen, the Indians fishing up-river, the bears and other predators, and so reaches the spawning grounds, is called the "spawning escapement". The spawning escapement must be large enough to reproduce not only

its own numbers, but a harvest of salmon for the fishermen at least equal to the harvests of previous years. And all along the way towards the new harvest and the new spawning escapement there will be losses, losses in enormous numbers to flood or drought, to obstructions and to predators of all kinds, from bears to bullheads, from seagulls and seals to squawfish and sharks. These alone, without the fishing and without the man-made changes to streams and watersheds, make it fairly certain that not more than four or five fish for every spawner of the previous cycle will live to start the journey back to the river.

There is no doubt that before white men began fishing on the Pacific Coast, every salmon stream was producing up to its fullest capacity. There was a spawning escapement, over and above the natural hazards and the Indian fishery, that filled the spawning waters and used the nursing qualities of streams and lakes to their limit. At first the white man's fishery took only a surplus. But in time, as gear improved and the numbers of fishermen increased, the catch began to cut the spawning escapement beyond the danger point. There were no longer enough eggs being buried in the gravel to yield both harvest and future spawning escapement.

In a resource so enormous and so little visible to human eye through most of its cycle, any gradual decrease is not easily detected. And when it does become obvious that something is wrong, it is all too easy to find other causes than overfishing that may account for the trouble. British Columbia seems to have realized rather quickly that it was necessary to do more for the salmon than just catch them, because she began hatching eggs artificially and planting the fry in streams as long ago as 1885. This early effort handled just under two million sockeye fry, but plantings increased every year until by 1927 a total of over two and a quarter billion fry, mostly sockeyes, had been artificially hatched and planted back in suitable streams.

All this effort made no apparent difference.

The runs continued to fall off and the size of the annual harvest was only maintained by much greater fishing effort, by reaching out to more distant waters and by using the less desirable species.

The Biological Board of Canada (now the Fisheries Research Board) then undertook a long, careful and detailed experiment at Cultus Lake, a sockeye breeding area tributary to the lower Fraser. For several years a complete check of the spawning escapement and the downstream migrants was made. In some years, natural spawning was permitted, in others the fish were stripped and the eggs artificially hatched. In both cases the young fish were trapped and counted on their downstream migration, and about a hundred thousand of them were marked so that they would be recognizable on their return. These experiments led to two important conclusions: (1) that there was no significant difference at all between the results of natural spawning and artificial stripping and hatching, and (2) that only 0.1% or 0.2% of the eggs, whether naturally or artificially hatched, can be expected to return as adult salmon in the harvest or the spawning escapement.

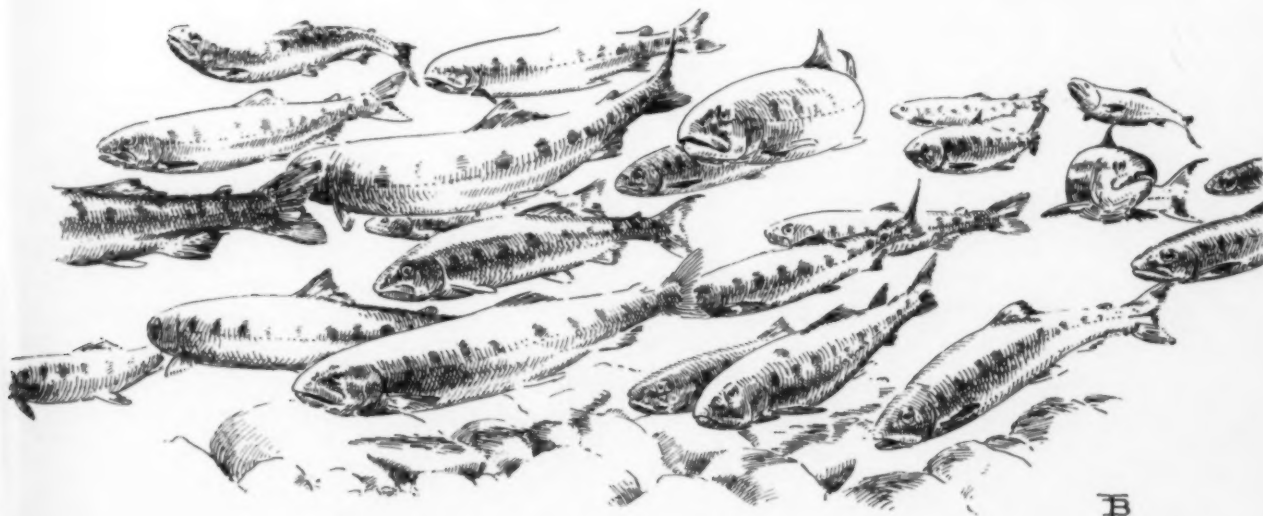
The first of these points, by itself, was quite enough to show that the way to increased runs could not possibly lie through hatcheries. The second showed that the enormous figure of two and a quarter

billion eggs handled by the hatcheries over a forty-year period actually had little meaning. The average of fifty million fry produced each year would yield only 50 to 100,000 adult salmon out of a normal harvest of some twenty million, scarcely an important number even if the work of the hatcheries had proved more efficient than the work of the salmon themselves.

So hatcheries are no longer used in British Columbia in any direct effort to increase the salmon runs. They are valuable in experimental work, chiefly in attempts to transplant fish and restock depleted breeding areas or establish new ones. This work has not so far been markedly successful, chiefly because of the unknown factors influencing migration, but it offers some hope and undoubtedly will be continued.

Obviously the saltwater life of the salmon is largely beyond human control. And the spawning and hatching of eggs is, in nature, such an efficient and relatively safe process that little can be done to improve it. So present conservation efforts are directed mainly towards three objects — ensuring a sufficient escapement of salmon to produce the eggs necessary for future runs, improving spawning areas that have been adversely affected by human developments, and protecting the young salmon between their emergence from the gravel and their arrival in salt water.

Young sockeye migrating from fresh water to the sea usually move in mass formation.



It is no simple matter to ensure a proper spawning escapement without interfering unnecessarily with the commercial catch — the legitimate and reasonable harvest of the resource. Certain general provisions controlling the fishery have been made. These are seasonal and, during the season, weekly closed times that allow the fish periods of safe movement. There are regulations governing the sizes of nets and methods of using them. There are certain areas, usually near the mouths of rivers, that are closed to fishing at all times.

These provisions and others like them have a useful overall effect, but more particular and more flexible controls are needed. Long and painstaking research has shown that in some seasons it may be safe to harvest as many as three or four fish for every one that is allowed to go through to a certain river and spawn, while in other seasons it may not be safe to take even one fish for every one in the spawning escapement. It has been shown too that the spawning escapement, to be fully valuable, must be spread throughout the season, not crowded in at one end or the other. To achieve these ends, the Minister of Fisheries now has power to order special closures at any time when a check of the spawning beds shows that they have an inadequate population.

The control of the fishery has already proved effective and is likely to become more and more so as further research gives a clearer picture of the movements of the salmon and of how and when the controls are best applied. Reduction of the heavy losses of young salmon in the nursing streams and lakes and on their migration to salt water is a more difficult problem. In some cases improvement can be made by removing or providing a safe way over obstructions in the streams or through low water. Some control of predators, particularly squawfish and other coarse fish, is already possible and further research will undoubtedly develop still more effective measures. But the exact effect of predators

and competitors in a river system is never simple, and controls are neither simple nor cheap to apply. Young salmon are preyed upon by many creatures — trout, char, sculpins, squawfish, ling and others below the surface of the water; diving ducks of several kinds, kingfishers, sea-gulls and herons from the air, to name only a few. All of these have their effect upon each other, as well as upon young salmon, and haphazard attempts at control can throw out a balance and do more harm than good. Adult salmon are preyed upon by seals and sea-lions, otters, mink, coon, bears and eagles. These predators are not all seriously damaging to the runs, but excessive numbers can make them so under the right conditions. Seals and sea-lions in and near the rivers during the time of the runs are particularly harmful, and regular control is attempted.

If the province had remained in its natural state, these measures alone would probably be enough to maintain and even increase the fishery. But steadily increasing industrialization, and the rapid extension of logging operations through the length of nearly every watershed, are wholesale threats to the future that only co-operation and wise planning can counteract. It is obvious that development must take place, that logging and industrialization will both go on. In the past, logging has been very damaging. Many spawning streams have been blocked by logs and brush; many watersheds have been stripped so bare of timber that smaller streams have become little more than drains, dry in summer, raging torrents that destroy spawning beds in winter; many of the larger rivers have exaggerated floods and extremes of low water that are almost as disastrous. Fortunately logging operations are now being somewhat more wisely conducted, much logged-over land has been naturally or artificially reforested and there is reason to believe that many watersheds will gradually improve. Legislation, together with a greater understanding of the importance of spawning streams and the untiring efforts of fishery officers, has helped to prevent the careless

T. Braysshaw.



Most spring salmon are caught by trolling as they approach their rivers in July, August and September.

blocking of streams. Though enormous damage has been done, often unnecessarily, there is good reason to hope that the worst is past.

Industrialization too often has meant

heedless use of the river systems. Mines and plants and cities have caused pollution, always unnecessary, that has done much damage. Streams have been carelessly diverted for irrigation or other purposes.

Chum salmon are much like sockeye in appearance.



T. Braysshaw.

Dams, both large and small, have been built without making proper provision for ascending and descending salmon. Here again there is evidence of improvement, wiser planning, a fuller realization of the enormous value of the salmon runs and their high importance in the economy of the province. Bitter experience, as well as careful research, has shown that much can be done to compensate for even the largest developments.

Settlement itself, the mere fact of many people living in what was once wilderness, has proved at times a serious threat. Children, and even adults, seeing great numbers of spawning salmon exposed in the smaller streams, have often attacked them with stones or clubs or gaffs and caused serious losses. These may seem small things, and in themselves they sometimes are, but in cumulative effect throughout the province they are important. Education, inside and outside the schools, has done much to help. No one likes to deprive a small boy of his pleasures, but the barefoot urchin stoning salmon in a September stream should become a creature of the past if he knows what is good for his future.

International Aspects

The salmon runs of British Columbia are not a purely provincial concern or even a purely national one. Fraser River salmon, in their migration, pass through American waters, and the rights of American and Canadian fishermen to an equal share in the catch has now been recognized by international treaty. The International Pacific Salmon Fisheries Commission, modelled on the International Fisheries Commission

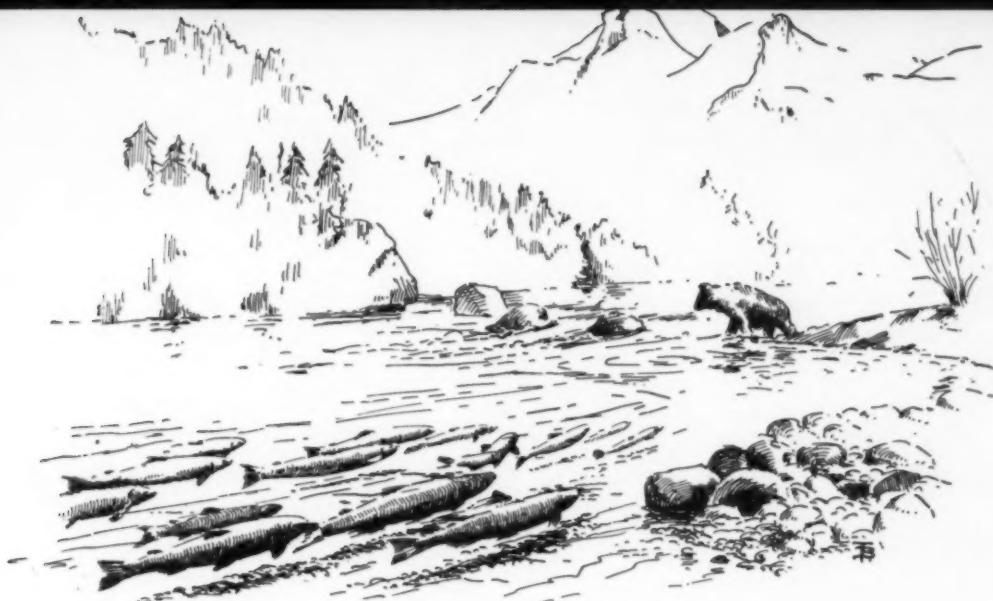
that was so successful in restoring the halibut fishery, now has full control of the Fraser watershed and has undertaken a tremendous improvement program.

No discussion of the British Columbia salmon industry is complete without some reference to the disastrous rock-slide that blocked the Fraser River canyon in 1914. This slide is usually said to have occurred in 1913, the last big year of the sockeye cycle, but actually the salmon of 1913 were blocked at various points in the canyon by the dumping of rock during the building of the Canadian National Railway. The slide at Hell's Gate, also caused by railroad construction, occurred in 1914, another important cycle year, so that the runs of two big years out of four were very seriously affected. But it is also true that these disasters occurred at a time when overfishing was beginning to show its effects, and they served to draw public attention to a consistent and serious decline in the runs.

One of the first actions of the Salmon Commission was to examine the obstruction at Hell's Gate, which had been formidable at certain water levels even before the slide, and to install fishways there which gave the fish comparatively easy passage. At the same time the Commission began the important work of controlling the commercial catch to ensure a proper spawning escapement in each of the several runs that make up a Fraser River season. From there it has gone on to a thorough examination of spawning areas, transplanting experiments designed to re-establish depleted runs, removal of

Federal Department of Fisheries fishways help salmon reach the spawning grounds.





Bears and other predators take their toll of the salmon run.

obstructions and other work, all of which shows promise in time of restoring the Fraser runs to their former abundance and perhaps building them beyond it.

The Fraser is a Canadian river that yields an important harvest to United States fishermen. The Columbia, whose salmon move northward through the length of the British Columbia coast, is an American river that yields a harvest to Canadian fishermen. In the same way British Columbia's Skeena river, her second largest stream, probably contributes to the harvest of the Alaska fishermen. And fishermen of both nations fish off each other's coasts beyond the three-mile limit. So the Pacific salmon fisheries are truly international, and the degree of international co-operation already achieved gives strong hope for their perpetuation and improvement.

The Pacific salmon runs are a part of the world's riches. It may once have been enough to consider them Canadian or American, but in this present era of increasing international awareness it is evident that they are one of the world's great sources of protein food and, as such, of vital concern to the whole human race. In the dramatic story of the salmon, its hatching in the gravel of a mountain stream, its long ocean wandering and faithful return, it is easy to forget that it makes available to man,

in useful form, the tiny planktons that are so enormously abundant in salt water. Both herrings and euphausiid shrimps, which are the salmon's main food, feed largely on diatoms and other plankton; and this natural chain, self-reproducing, demanding little except sensible use, makes available an abundance that could be collected in no other way.

There are difficulties and obstacles in the way of perpetuating the salmon runs. Industrial growth will continue to present new and complicated problems. Continued logging will make stream control more and more important. A growing population will increase pressures on the resource. To meet these problems it will be necessary to know in greater detail the life history of every race of salmon and to understand more fully every phase of environment that influences them.

But the salmon belong to the nation's economy and the world's economy. Properly understood and properly cared for they represent a perpetual crop that nothing else can replace. It is the clear responsibility of this and all future generations of Canadians to see that nothing is permitted to reduce either the annual harvest or the spawning escapement that is necessary for future years. No other resource offers mankind so much in return for so little.



Canada's Covered Bridges

by PHIL SHACKLETON

Photographs by Capital Press unless otherwise credited.

REMEMBER when the bridge over a rural stream was more than a means of getting to the other side without wet feet? When it was also a shelter from the rain and a retreat from the hot sun of July? When its shingled roof was confidant to courting couples and its darkened interior often heard the gallant swain pop his crucial question?

In those days a bridge was not a simple, one-purpose utility. It was also shade for a trout pool, a good place to rest the horses on a summer afternoon, and a bathing

station for youngsters freed from the stifling classroom.

Today's structure of steel and concrete serves none of these functions. Today's bridge is only a means to speed traffic across the river. It is simple, efficient and durable, but entirely without romance.

The wooden covered bridge is slowly going the way of the horse and buggy. But here and there, even on the Trans-Canada Highway, this relic of romance survives. And on the county concessions and winding dirt roads which the tourist seldom travels,

At top:—This old covered bridge set on concrete piers spans the Gatineau River at Wakefield, twenty-four miles north of Ottawa in the Province of Quebec.

the covered bridge still serves faithfully.

New Brunswick boasts of having more wooden covered bridges than any other province or state.

Quebec is runner-up to New Brunswick with many fine covered bridges, most of them off the beaten track. The explorer will see few along the main highways, but on the secondary roads he can "collect" bridges of infinitely varied design.

Progress has almost entirely pushed the covered bridge out of Ontario for only one is still in use in the province. This is the veteran structure over the Grand River at West Montrose in the southwest of the province.

Although many of the old bridges have disappeared, their historical interest is attracting new attention, and there is a movement to preserve those still standing. New Brunswick officials believe them to be a good tourist attraction and advertise widely that this is the last home of the covered bridge.

Highway departments are repairing and re-roofing the bridges, rather than dismantling them. In Quebec, when a new concrete bridge replaces the covered variety, the old one is usually moved a short distance away. The highway crosses the new bridge, but the old covered bridge is preserved nearby as a memorial of the past.

New Brunswick, however, is still building one or two new covered bridges each year.

It seems quite obvious that covered bridges in Canada were adapted from those made popular in the colonial New England states. But covered bridges are older than any North American settlement. Probably the oldest in the world is the Kappell Bridge at Lucerne, Switzerland. It was built in 1333 and is still in use. In the United States, New England does not hold the monopoly on covered bridges that one might expect. Ohio, Pennsylvania and Oregon all have more covered bridges today than the New England states.

And why was the old wooden bridge provided with a roof? The answer, say some engineers, is very simple: to protect the timbers and make the bridge last longer. The roof and sides keep out most of the rain and snow, and while unprotected timbers may rot in fifteen years, some covered bridges have remained sound for up to eighty years. Richard S. Allen, probably the foremost covered bridge hobbyist in the United States, quotes an old man he met in Maine. When asked why the bridges were covered, he answered, "It's for the same reason that women wore petticoats—to protect the underpinning". Evidently, today, neither the bridge builders nor the ladies are quite so much

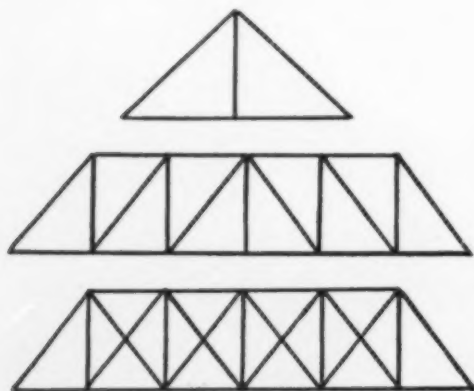
A short, stubby bridge, much like a barn in appearance, in the Tobique Valley of New Brunswick.



concerned about the underpinning.

But another school has a different answer. They believe the earliest of these bridges had a roof but no siding. Open sides would have allowed plenty of rain to reach the bridge timbers and so they think the roof was not built for protection. The men who built the first bridges were probably more familiar with building houses. When they learnt that truss construction on each side resulted in a stronger bridge, they decided that bracing across the top would make it even stronger. Once this was in place, it seemed to them only logical to add a proper roof with shingles. They built the strongest bridges they could, and if a roof and sides made a stronger bridge, then they built accordingly even if the result did look like a narrow barn set across the stream.

The principle basic to the construction of covered bridges is credited by engineers to Theodore Burr, an American who used it in building a bridge in 1798. The same principle had been discovered by an Italian, Andrea Palladio, in 1570, but it seems to have been forgotten and Burr is given full credit for its rediscovery. The principle is that of the king post truss. The longest available timbers are used as diagonals, meeting in the centre at the top of the vertical king post. The base of the triangle thus formed is longer than any available timber and is made of two timbers shorter than the diagonals.



Top to bottom: King post truss,
Burr truss,
Howe truss.

Thus, Burr rediscovered a truss which would enable him to build a bridge over a stream wider than any piece of available timber. The two parallel trusses, joined and braced by floor beams and rafters above, made a very strong bridge.

Also, in 1798, the early bridge builder developed the Burr truss, really an overlapping of the king post truss, to make possible the building of an even longer single span. During the next fifty years, others developed further refinements of the truss principles so that a timber bridge, especially with the use of piers, could be built as long as needed. Probably the most common principle used in building Canadian bridges was the Howe truss, a further development from the Burr truss.

Certainly, the covered bridges were and are strong and durable structures. In the United States, several have served many years as railroad bridges. More than once, covered bridges have been dislodged from their piers by floods and sometimes carried for miles downstream only to be returned and, after minor repairs, to fill many more years of duty.

Many covered bridges were at one time toll bridges. The toll system was a familiar and accepted means of defraying the cost of road building and, since the bridges were part of the road system, it followed naturally that one should pay to use them.

Although Ontario has but one covered bridge left, there were others in earlier days, notably at Martintown, Williamstown, Napanee and Frankford. Along the Grand River they were probably introduced by the Mennonite pioneers who had been familiar with them in their earlier Pennsylvania settlements.

One old bridge across the Grand River at the village of Conestoga is recalled as having sides but no roof. The one remaining at West Montrose, however, has both. It is 196 feet long, 13 feet high, and has an inside width of 17 feet. Known as the kissing bridge in older times, it was built in 1881 by John and Sam Bear for the Township of Woolwich. Some of the old white



On the country roads of New Brunswick are many bridges like this one over the Salmon River near Salmonhurst. At right is what is believed to be the old toll house.

Ontario's last covered bridge, the seventy-year-old veteran across the Grand River at West Montrose. Unusual features are the overhang at bridge-ends and the narrow louvered windows.



pine timbers are nine by eighteen inches and nearly fifty feet long and not until 1933 were replacements for a few rotten timbers necessary. Inside, an old-style kerosene lantern still hangs from a roof beam and in conformity to an old by-law it was until quite recently lit at dusk by a verger. As was the case with most covered bridges, a contract used to be awarded for "snowing" the floor in winter so that sleighs could cross without difficulty. This job is still done, but nowadays by a highway patrolman.

In Quebec there are many covered bridges, the oldest of them in the Eastern Townships. More have been built in recent times under the direction of the Department of Colonization.

One of the oldest and longest covered bridges in the province spans the Coulonge River at Fort Coulonge in the upper Ottawa Valley. On provincial highway, Route 8, it has six spans and is 530 feet long. It was built about 1855 by John Childerhouse, an Irish emigrant who learned his trade as carpenter in Pembroke, Ontario. At the age of 20, his first contract was for the Coulonge Bridge. A hardy fellow, he walked home 16 miles each week-end, and so the story goes, in his bare feet since he owned no

shoes. He went on to construct many buildings, including a church which is now the Municipal Building in Fort Coulonge, and ended his career by building and operating a textile mill in Eganville, Ontario. The Coulonge was his first and only bridge, but he built well for now, nearly a hundred years later, it still carries traffic across the Coulonge River.

A unique Quebec bridge is one built in 1861 at the village of Powerscourt, crossing the Châteauguay River, south of Huntingdon. It is believed to be the only covered bridge in the world built with the McCallum inflexible arched truss, a principle patented by Daniel Craig McCallum of New York in 1851. Its length of 170 feet and its width of 20 feet make it unusually spacious among covered bridges. The curved, arched roof is also unique.

Just a few decades ago there were scores of covered bridges in Nova Scotia, but today only two remain. Until this year there were three, but in January the best known of the veterans, the Horton Bridge over the Gas-pereau River on Route 1, near Wolfville, was condemned as unsafe for heavy traffic and destroyed. It is being replaced by a Bailey bridge. The first Horton covered bridge was burnt in 1869 and the late bridge was built in 1878. The old wooden timbers supporting the bridge floor had been replaced by steel spans some years ago.

The oldest of Nova Scotia's bridges is the Upper Kennetcook Bridge, spanning the Kennetcook River in Hants County, and built in 1873. The other veteran is the Weeks Bridge, about seventy years old, crossing the East River St. Mary's near Aspen in Guysboro County.

When steel bridges first became popular, the wooden structures began to disappear, and old-timers in parts of Nova Scotia recall many an election which was won with a promise to replace the older span with a new steel bridge.

About three hundred covered bridges are still in use in New Brunswick. The number is so high partly because the province has more rivers and streams than any area of



From beneath the bridge the durable construction of cross bracing and beams is visible.



The old Weeks Bridge over the East River St. Mary's near Aspen is Nova Scotia's most attractive covered bridge. Its humped back and shingled sides make it a unique structure.

Oldest of three remaining bridges in Nova Scotia is the Upper Kennetcook Bridge, built in 1873.





Above—This covered bridge just above Hartland is typical of many in New Brunswick. It crosses Presqu'isle Creek which here joins the St. John River (on right).



Best known in Nova Scotia until its destruction in January was the Horton Bridge over the Gaspereau River near Wolfville. This second bridge on the site was built in 1878.

N.S. Bureau of Information



Pride of New Brunswick is the Hartland Bridge, longest covered bridge in the world. Its second claim to fame is the adjoining covered foot-walk.

equal size on the continent. To travel about their province, New Brunswickers use 10,000 bridges of every kind.

Pride of the province is the Hartland Bridge, longest covered bridge in the world. It was originally built as an uncovered toll bridge in 1897, but in 1920 was replaced by the present covered bridge with free traffic. It carries the traffic of Route 2, part of the Trans-Canada highway, over the St. John River a few miles above Fredericton. The bridge is nearly 1,300 feet long. An unusual feature is its separate covered footwalk, built on the downstream side in 1943. Very few covered bridges have a separate path for pedestrians.

Its nearest rival for length is a covered bridge in Norway which is 1,082 feet long,

while Quebec has one at Cap Chat which measures just 1,000 feet.

Enthusiasm in New Brunswick went so far as to name a village Covered Bridge. On the Nashwaak River, not far from Fredericton, it was the site of the first covered bridge in the province, built in 1838. Unfortunately, it was destroyed in 1911.

New Brunswick favoured and still favours covered bridges because they are one of the least expensive truss type bridges to build and maintain, and because in most cases they can be built from local materials by local men. For the larger bridges, however, it is now necessary to "import" Douglas fir timbers from British Columbia.

But even in New Brunswick, the covered bridge must in some cases give way to



modern structures of steel and concrete. A common sign over the entrance to a covered bridge reads: "20 dollars fine for driving faster than a walk on this bridge." It is a regulation more often ignored than observed, but even so it is not very satisfactory for modern

highway traffic. As a result, New Brunswick is concentrating on saving the bridges on secondary roads. The famous Hartland Bridge is now the only one in the province on a main highway.

The old time bridges are sometimes



Above:—Quite unusual is the hipped roof of this bridge which crosses the Salmon River in New Brunswick.

Representative of New Brunswick's three hundred or so covered bridges is this span over Milkish Creek near Bayswater on the Kingston Peninsula.



criticized as fire hazards, because they are narrow or because they must be "snowed" in winter to facilitate rural sleigh travel. But most people in the covered bridge regions are quite fond of them. A suggestion

now that an old bridge be torn down would probably be met with strong local objection, as well as a torrent of abuse from the advocates of covered bridges for traditional interest and local colour.

Above:—This view of the bridge near Wapske, N.B., shows clearly the protective awning over the side opening.

An odd composite bridge across the St. John at Florenceville, N.B., has four spans of steel arch construction and one of the covered wooden type.





Beginning of the Canadian Red Cross

by MAX BRAITHWAITE

THE great humanitarian movement known as the Red Cross was inspired by the horrible suffering of thousands of wounded soldiers after the battle of Solferino, between the French and Sardinians on one side and the Austrians on the other, on June 24, 1859.

Monsieur Henri Dunant, a young Geneva business man, arrived in the midst of this reeking carnage hoping to obtain a concession from the victorious Napoleon III. But the suffering he saw made him forget his mission. He began helping the wounded, finding drink for the thirsty, dressing wounds, passing out tobacco and, most important of all, organizing hundreds of others to help him. Dunant never forgot that morning. His devotion to the cause of mercy (to the detriment of his business interests) finally brought about, in 1863, an international meeting in Geneva at which the Red Cross was born.

Twenty-two years later, during the Riel Rebellion of 1885, the first Red Cross flag of mercy was used in Canada. On April 24th of that year Surgeon-Major G. S. Ryerson, later Major-General, C.A.M.S., contrived an ambulance, using a horse-drawn wagon to carry stretchers and medical equipment. To distinguish it from the army wagons he improvised a Red Cross flag of white and red factory cotton borrowed from the ammunition column. Later, at the Battle of Batoche, May 9th to 12th, the same flag

was used again. This flag, officially recognized as the first ever used in Canada, is now in the central Public Library of Toronto.

The late Brigadier-General Charles F. Winter, who also fought in the Riel Rebellion, records another use of the Red Cross emblem.

"At Battleford, on 2nd May, 1885," he wrote shortly before his death in 1947, "a small detachment of some twenty medical dressers—all undergraduates in medicine of the University of Toronto and serving members of 'K' Company, the Queen's Own Rifles—had arrived from the east during the absence of Colonel Otter's reconnaissance to Cut Knife Hill and had taken over care of the wounded brought back from that engagement.

"With a cotton sheet and some red flannel they managed to make up a Red Cross flag and it was flown over the dressing station and temporary field hospital at Fort Otter, Battleford."

General Winter was himself severely wounded in the Cut Knife Hill engagement and travelled forty or more miles into Battleford on a springless farm wagon, with, as he put it, "considerable pain and discomfort".

"I still have a keen recollection of the appreciation and confidence felt at the sight of the make-shift flag of 'the soldier's best friend' flying over my temporary haven in the little field hospital at Battleford", he wrote. It created in his mind a resolve that henceforth he would always be happy to do anything he could for "the grand old Society of the Red Cross". He mentioned, also, the flying of Ryerson's hand-made flag at the Battle of Batoche.

So the Red Cross emblem, conceived in the mind of Henri Dunant on the battlefield

At top:—The first Red Cross flag to be used in Canada is shown by Miss Mary Galbraith, granddaughter of the late Major-General G. S. Ryerson, who made the flag and flew it from his horse-drawn ambulance while serving as a medical officer in the Riel Rebellion of 1885.

BEGINNING OF THE CANADIAN RED CROSS

of Solferino, carried out its mission of mercy in Canada a short twenty-six years later.

General Ryerson, whose interest in Red Cross work and ideals had been stirred by his visit to Europe as a young medical student, never let the idea slip out of his mind. In the fall of 1896 a group of representative Canadians, which included many prominent statesmen and public men, held the organization meeting in Toronto. The new society, with General Ryerson as chairman, was known as the Canadian Branch of the British National Society for Aid to the Sick and Wounded in War, which held the subtitle of the British Red Cross. This was the first overseas branch of the British Red Cross.

Its earliest active work was during the Spanish-American war in 1898, when subscriptions were invited. The small amount of money subscribed was given to the Spanish for their sick and wounded soldiers, one of the first examples of Canada's understanding of the neutrality of Red Cross.

With the outbreak of war in South Africa, however, the infant Society showed signs of active growth. Local branches were formed in Montreal, Quebec, Winnipeg, Vancouver, Fredericton and more than fifty smaller centres. Supplies of clothing, invalid food, and blankets were collected, as well as approximately \$50,000 for forwarding to South Africa.

General Ryerson was appointed Red Cross Commissioner for Canada and in January 1900 sailed to South Africa with the second Canadian contingent. At Orange River Crossing he distributed money and comforts to the forty-seven Canadians he found in hospital there. At Kimberley he bought certain necessities, including basic hospital equipment and invalid supplies for the sick and wounded, who daily arrived in ox-wagons. At Bloemfontein he provided such varied articles as mattress ticks, bath sponges, mosquito netting, towels, fans, feeding cups and even fresh eggs.

In 1909, through the Canadian Red Cross Society Act passed by the Parliament of

Canada, the Society obtained its first charter. This Act established the Canadian Red Cross Society as a corporate body and specified its functions in furnishing volunteer aid in accordance with the Geneva Convention. At the same time the Society was bound to work in affiliation with the British Red Cross Society. In November 1927 the Canadian Red Cross Society was recognized by the International Committee of the Red Cross as an independent national society.

At present the Canadian Red Cross Society has ten divisions (one for each province) and almost 1,400 branches. So extensive is the work of mercy that each year \$5,000,000 must be raised through volunteer contributions (this year's budget \$5,222,000); but this represents only a small part of the value of the help rendered through the Society, since it is estimated that 97 per cent of all work done is voluntary and without pay.

The ideals of Henri Dunant have never been forgotten. To quote Dr. W. S. Stanbury, who in January 1949 succeeded Dr. Fred W. Routely as National Commissioner: "Wherever the Red Cross emblem flies, in peace or in war, it is the universal expression of the conscience of mankind".



The Red Cross Blood Transfusion Service, begun in British Columbia in 1947, has since spread to eight of Canada's provinces. To date 648,790 bottles of blood have been collected and 282,136 patients have received free blood from the service. This project, now one of the leading Red Cross activities, has proved of inestimable value in times of both war and peace.

EDITOR'S NOTE-BOOK

Phil Shackleton is a graduate of Ottawa's Carleton College. On completing his course, a few years ago, he and his wife, who is an expert photographer, set up and successfully established Capital Press Service in Ottawa.

* * *

E. O. Hoppé has travelled the world extensively in the course of a career devoted to the development of photography as an art. Mr. Hoppé lives in England but his photographs are well known in many countries. He now spends considerable time writing of his travels and experiences.

* * *

Roderick L. Haig-Brown is a judge of the Juvenile Court of British Columbia but he is better known throughout this and other countries as an author. He has published numerous books, some specially written for boys, and many with fishing as a theme. Special recognition was given to *Starbuck Valley Winter* and *Saltwater Summer*. His last book was *On the Highest Hill* but another is now with the publishers. Mr. Haig-Brown was born and educated in England but he has for many years been a resident of Vancouver Island.

* * *

ERRATA

Vol. XLIV:1, January 1952. Page 24: the date in caption should read 1860; page 32: the picture of the first railway engine was drawn from what proved to be an inaccurate verbal description and is not an authentic representation of the "Dorchester". The Editor was unaware that the print had been withdrawn from the Chateau de Ramezay.

* * *

AMONGST THE NEW BOOKS

Geography of the Pacific

edited by Otis W. Freeman

(John Wiley and Sons, New York, \$10.00 U.S.)

This book fills a wide gap in the collection of regional geography college text books. Such texts usually deal with continents or countries, but none has attempted to cover the oceans, their islands and their shores. Certainly the Pacific is deserving of such a book. Its area covers more than one-third of the surface of the globe — an area greater than all of the land above sea-level on the earth. Its importance is suggested by this quotation

which begins the preface: "The Mediterranean is the ocean of the past, the Atlantic the ocean of the present, and the Pacific the ocean of the future". World War II brought an awareness of the Pacific and its islands to America, and later events have emphasized the fact that we should know more about this large region.

Professor Freeman, who is head of the Geography Department at Eastern Washington College of Education, has brought together an outstanding group of experts to describe the features and peoples of the Pacific area. Freeman is probably one of the best and most prolific geography writers in western North America. He has already been co-author of two other standard texts. One of them, also published by Wiley, dealt with the "Pacific Northwest", the land area adjoining the northeastern part of the Pacific Ocean. In this present book Freeman calls upon personal experience to write four of the chapters, including an excellent summary in Chapter 1, called the "Geographic Setting of the Pacific".

The book has nineteen chapters and thirteen authors. Chapter 2 on the "Native Peoples of the Pacific", by Kenneth P. Emory, anthropologist at the University of Hawaii, is a condensation which every student of human geography will enjoy reading. Many of us have heard of the explorers of the Pacific insofar as they travelled near the continents fringing the ocean, but few will be familiar with the interesting history of the islands which is unfolded by Curtis A. Manchester, also of the University of Hawaii, in Chapter 3. After these ninety pages of background material, the remainder of the book has a regional approach. The islands are described in groups: Northern and Eastern Melanesia; the Mariana and Caroline Islands; Micronesia; the Philippines; Hawaii; Eastern, Central and Western Polynesia; Indonesia; Kurile and Ryukyu Islands; the islands off South America; and the Aleutian Islands. Although the mainland areas of the continents are not discussed except insofar as they are related to the islands, an exception is made in the case of the two excellent chapters on Australia by Clifford M. Zierer, of the University of California in Los Angeles, and a companion chapter on New Zealand by Robert Bowman. The final chapter, by Charles M. Davis, deals with trade, transportation and strategic location in the Pacific. A notable omission from the discussion of island groups is a chapter on Japan, which the editor says is already adequately covered in other text books. Since these usually discuss Japan as a part of the continent of Asia, it might have been of value to include a chapter on Japan as a power in the Pacific Ocean.

Geography of the Pacific is another in the excellent series of regional geographies published by J. Wiley and Sons. Technically the series is improving, as illustrated by the numerous well-executed maps and descriptive pictures. Although many of the maps have been taken from other sources, or previously published works, they maintain a high degree of uniformity and clarity. Each chapter includes a list of reference works, most of which

(Continued on page XIII)



THE CANADIAN GEOGRAPHICAL SOCIETY

ANNUAL GENERAL MEETING

The twenty-third Annual General Meeting of The Canadian Geographical Society was held on February 21, 1952, in the Lecture Hall, National Museum of Canada, Ottawa. The President, Air-Marshal Robert Leckie, presided.

After approval of the minutes of the twenty-second Annual General Meeting, the President opened the brief business proceedings of the meeting with a report on the Society's activities during 1951. He reported that the finances of the Society were in excellent shape and a surplus had again been applied to the credit of the Geographical Research Fund as a result of the year's operations.

"Publication of the *Canadian Geographical Journal* is the Society's main activity," said Mr. Leckie, "and some 15,000 copies a month are in circulation. During the past year fifty-nine articles were published, dealing principally with the physical, economic and human aspects of the geography of Canada and to a less degree with other countries." The December Royal Visit issue had been extremely well received and the fifteen thousand copies printed in addition to requirements for members proved quite insufficient to meet the public demand. "You will, I am sure," he continued, "be interested to learn that a letter has been received from Government House stating, 'I have now received a reply from the Private Secretary to the Princess Elizabeth, acknowledging receipt of the copies of the Royal Visit issue of the *Canadian Geographical Journal*. The Private Secretary states that Her Royal Highness was delighted to receive the issue and had asked him to extend her appreciation of the kind thought in forwarding these copies'."

Reprints of special articles continued in demand, with ten new editions of former reprints and six new reprints published during the year—a total of about 384,000 booklets.

It was gratifying to be able to report that a French edition of the *Provincial Geographical Aspects* had been approved as supplementary readers and as reference books for teachers in the public schools of Quebec. Further evidence had been received of the success of the booklet "Industry in Action in the Province of Quebec" produced by the Society; more than three thousand letters from all parts of the world had been received by the Quebec Government commending this publication and copies had been released for senior grades of Canadian schools and for university libraries. Back issues of the *Journal* had been distributed to rural schools through provincial departments of education and had been much appreciated. The *Journal* was being supplied regularly by the Canadian Legion to Canadian Army units in Korea, to R.C.N. ships in Korean waters, to R.C.A.F. active units and to the forces serving in Northwest Europe. A complete set of *Journals* had been given to the University of the Sarre.

During the year the Executive Secretary had revisited Canada's western provinces where he made contacts with Directors, members of the Editorial Committee, and government, educational and industrial authorities and arranged for new articles.

A grant had been made from the Research Fund to Mr. F. Laforest as a contribution to the Louis Liotard Expedition from France to the Amazon-Orinoco region of Brazil. Four scholarships were awarded to students (two Canadian and two British) for study at the McGill Geography Summer School.

Col. P. D. Baird lectured for the Society at a public meeting on the Baffin Island Expedition which he led in 1950 and which had been aided by a grant from the Society.

The President concluded by expressing the appreciation of the Directors for the services rendered during the year by the Editorial Committee, the Executive Secretary, and members of the staff.

The report of the Honorary Treasurer was then adopted and upon submission of the report of the Nominating Committee the ten retiring Directors were re-elected for a further three-year term of office.

At the conclusion of the business proceedings Air-Marshal Leckie introduced the guest speaker, Mr. Norman Marr, Chief of the Water Resources Division of the Department of Resources and Development, whose address was on the "Columbia River Basin". In an informative talk, illustrated by slides, Mr. Marr carried to his audience the epic story of the great potentiality of the mighty Columbia River in providing new hydro-electric power for the steadily expanding industrial needs of British Columbia. The speaker defined clearly how the International Joint Commission functioned to utilize fully and in harmony a great natural resource, involving flood control and irrigation, in addition to power, shared jointly by the peoples of the United States and Canada. An article based on Mr. Marr's address, illustrated by representative photographs of this enthralling mountain region, will be published in the *Journal*.

General McNaughton, on behalf of the Society, thanked the speaker for a most illuminating address.

Immediately following the General Meeting a meeting of the Board of Directors was held. Officers of the Society were re-elected for 1952 and Standing Committees were appointed.

1951 Supplement to "A REGIONAL BIBLIOGRAPHY of articles in the Canadian Geographical Journal 1930 to 1947"

Volumes XLII and XLIII

according to the classification of J. L. Robinson

I. CANADA, BY PROVINCES

A. NOVA SCOTIA

- Small Animal Sculpture. Marion G. Rogers. Jan. 1951

C. PRINCE EDWARD ISLAND

- Prince Edward Island Pictorial. April 1951

D. QUEBEC

- Old Churches of Quebec. Gérard Morisset. Sept. 1951
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Ile-aux-Coudres. Lyn Harrington. Aug. 1951
Winged Republic. Lyn Harrington. July 1951
Iron Ore Galore. J. A. Retty. Jan. 1951

E. ONTARIO

- Settlements on the Canadian Shield—Lake
Nipissing Area. George R. Rumney. Sept. 1951
Timber Management in Ontario. J. A. Brodie. March 1951
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Western Travel. George R. Rumney. Jan. 1951

F. MANITOBA

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Flight to Lynn Lake. W. L. Morton. Feb. 1951

G. SASKATCHEWAN

- The Cypress Hills. Wilfrid Eggleston. Feb. 1951

I. BRITISH COLUMBIA

- Trapping Crabs off the Queen Charlottes.
Harry Seaman. Aug. 1951
British Columbia's Dugout Canoes.
Sylvia Robertson. July 1951
Between the Tides on our Pacific Coast.
Nancy Gildersleeve. June 1951

J. YUKON TERRITORY

- Old Crow Altar Cloth. Douglas Leechman. Nov. 1951
St. Elias Mountains and the First Ascent of
Mount Vancouver. N. E. Odell. July 1951
The Alaska Highway. Lyn Harrington. June 1951

K. NORTHWEST TERRITORIES

- Some Eskimos of Chesterfield Inlet. J. Michéa. Nov. 1951
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Education Goes North. E. N. Grantham. Jan. 1951

L. NEWFOUNDLAND

- Where Handicrafts Build Homes. Adelaide Leitch. May 1951

II. CANADA—GENERAL

A. ART AND CULTURE

- Canadian Geography and National Culture.
Wilfrid Eggleston. Dec. 1951
Ottawa Children Know Their Museum.
Irene Todd. April 1951

B. BOTANY AND WILDLIFE

- Bird Series—Part XI. W. V. Crich. June 1951
Bird Series—Part X. W. V. Crich. March 1951
Plant Life in the Arctic. A. E. Porsild. March 1951
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E. HISTORY

- First Canadian Christmas Carol. Mabel Godwin. Dec. 1951
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Canadian Voyageurs. S. C. Ellis. Feb. 1951

F. INDUSTRIES AND WORLD TRADE

- Purse Seines to Lobster Pots. F. H. Wooding. Nov. 1951
Aluminum—the Story of Fifty Years of Growth
by the Canadian Industry. B. J. McGuire. Oct. 1951

K. GENERAL

- Floral Emblems of the Provinces. Marion Dick. Oct. 1951
The Canadian Red Cross in Other Lands.
Max Braithwaite. March 1951

L. GENERAL GEOGRAPHY

- Geography in the Universities of Canada.
J. Lewis Robinson. Oct. 1951

III. NORTH AMERICA

A. GREENLAND AND ICELAND

- The Eskimos of East Greenland.
Ejnar Mikkelsen. Aug. 1951

D. BERMUDA AND BAHAMAS

- Bermuda Today. June 1951

IV. SOUTH AMERICA

- Earthquake in Ecuador. Jan. 1951

VI. EUROPE

A. ENGLAND AND SCOTLAND

- Guildford, Surrey. Edgar W. Pitt. Oct. 1951
The Cairngorms. V. A. Firsaff. Aug. 1951
The Norfolk Broads. C. P. M. Robertson-Fortay. July 1951
Worcester, the Faithful City. W. H. Corkill. May 1951
The Royal Observatory Photographs the Sun.
Jacques Paul. Feb. 1951
London Travels. René Lecler. Jan. 1951

VII. AFRICA

- Focus on Tropical Africa. George H. T. Kimble. July 1951
African Career Woman. July 1951

VIII. AUSTRALIA AND NEW ZEALAND

- Australian Aboriginal Art. Dal Stivens. Feb. 1951

X. ASIA

C. SOUTHEAST ASIA AND EAST INDIES

- Busy People in Sarawak. Hedda Morrison. Nov. 1951
Pineapple Growing in Malaya. Aug. 1951
The Temples of Angkor, Vietnam.
Emile Condroyer. June 1951
Rice Problem of the Red River Delta, Vietnam.
Robert J. Garry. April 1951

D. INDIA AND BURMA

- The Korku Tribe of Central India. G. O. Boast. Sept. 1951
Scenes from Eastern India. Ernest Reid and
William Dunning. May 1951

XI. WORLD—GENERAL

- World's Seashore Harvest (Seaweed).
E. R. Yarham. May 1951
UNESCO Geography Seminar of 1950.
Patricia Stevenson. April 1951
Geography and International Understanding.
J. W. Watson. April 1951



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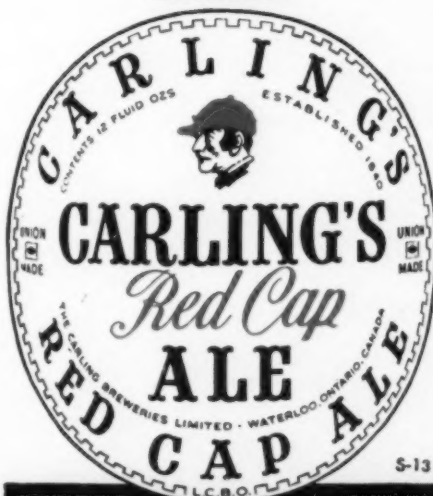
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(Continued from page IX)

are available in large university libraries, thus further increasing the book's value as a college text. To those of us whose homes lie on the rim of this "mightiest of oceans", and who are concerned about future events around it, Professor Freeman's book is most welcome and very timely.

J. LEWIS ROBINSON

* * *

Encyclopaedia Britannica World Atlas

(Encyclopaedia Britannica of Canada Ltd., Toronto, \$23.50)

This 1951 printing of the Britannica's well-known atlas is a greatly expanded and altered version, no less a useful locational and gazetteer tool, but much more a professional research aid for the writer and social scientist. The body of any atlas is the series of political regional maps and of these there are 111 pages, including separate atlas pages for almost every one of the American states and Canadian provinces. These are not very attractively lettered or coloured, and employ hachures (often degenerating into "caterpillars") rather than layer-tinting to justify the designation "political-physical", but they are quite adequate for their major purpose. For these there is a 115 page index with something over 100,000 entries.

Three other sections of the atlas will perhaps be of greater interest. The first is a series of 60 plates and text which places the volume in serious competition with the "academic" atlases (such as *Goode's School Atlas*, the new *Oxford American Atlas*, *Bartholomew's*, and like works). The plates include the usual introductory pages on map projections, "global views", and time zones, before beginning a series of some 30 world distribution maps. The latter are valuable for particularly interesting comparative maps of population (including natural increase, birth rate and death rate), of literacy, of distribution and age of larger cities, of import-export balances in world trade, and of other social phenomena. The maps of geology, landforms, climate, vegetation and soils, follow a rather norma

pattern; Kuchler's interesting system of vegetation classification has been used, as in Goode's, although it may prove more confusing than helpful in a general reference atlas.

Fourteen of the plates, accompanied by approximately three times the space in text, deal with one phase or another of political geography and these form, in the judgment of the reviewer, the most useful single innovation in the atlas. Not only are there separate world maps of the different imperial powers and aggregations, but maps of associations of nations based on international agreements, and of boundary changes, and a full text with tables indicate status, area, population, and constitutional data for each unit. There is also an excellent bibliography.

Two further sections include eight pages of "geographical comparisons" (heights of waterfalls and mountains, size of islands and dams, lengths of bridges, rivers and canals) which should be of great use to journalists and the waging public; nine pages of tables of comparative production, imports, and exports, among different political units, of thirty raw or semi-manufactured products; and a staggering 243-page statistical summary. In this last "geographical summaries" are given for well over 100 separate political units (a few minor ones are grouped together) for each of which there are fifteen different tables with information on population, production, transportation, finance

(Continued on page XV)

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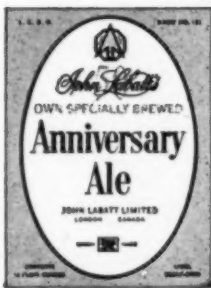


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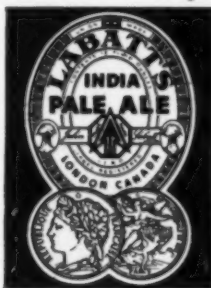
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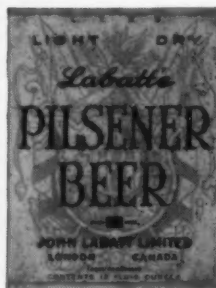
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(Continued from page XIII)

and trade. Separate tables are given to compare the different political units within each of nine regional groupings.

In conception these summaries represent a magnificent idea and as they are given they will be enormously useful. Their limitations are chiefly in terms of the time lag between collection of data of a unit, its assembly for the tables, and their editing and printing. As far as possible 1938 is taken as a base year and, where possible, information through the last decade is added, but such vast changes have occurred since 1938 that the data will often serve the purposes of the historical geographer better than those of the student of the affairs of 1951. The choice of dates, too, has often been made haphazardly, or the compilation of data has been made at different times and deadlines have prevented revision. Thus, if we would compare numbers of livestock among the British Dominions, for example, we have Canadian data for 1938, 1941 and 1949, South African data for 1938 and 1939, Australian for 1938, 1942, 1945 and 1948, and New Zealand for 1938, 1943 and 1947. Since annual data are easily available for at least three of the four countries, it seems careless to the point of perversity that 1938 remains the only year in which even two of them can be compared.

Although it is easy to pick flaws in such a monumental and comprehensive volume, it remains a magnificent and authoritative reference work for which we must be grateful to the publishers. If few individuals will be able to afford it, every reference library in school, university, government or business, should lose no time in acquiring it, for it will be a great saver of research time. We can only regret that it was not even more useful, and handsome, as the same effort and expense might well have made it.

ANDREW H. CLARK

* * *

Good-bye to Boot and Saddle

by The Hon. E. G. French

(Ryerson, Toronto, \$5.00)

The theme of this book is revealed by its sub-title: "The Tragic Passing of British Cavalry". The author, the son of the Earl of Ypres, better known to many as Sir John French, a hero of the Boer War and the War of 1914-1918, laments the disappearance of cavalry from the British Army and its replacement by mechanized units. He finds today's army one of "drab, dreary, slovenly, mediocrity".

There is a great deal of interesting detail about the history of the old cavalry regiments including the horse artillery and their magnificent feats of arms and the author is at his best, perhaps, in his warm tribute to his own father. It seems strange that a man who obviously loves horses so well should nowhere find space to rejoice that these patient beasts are now spared the torture of being driven into war to suffer wounds and death in a cause they can not possibly understand and from which they can not hope to reap any imaginable benefit.

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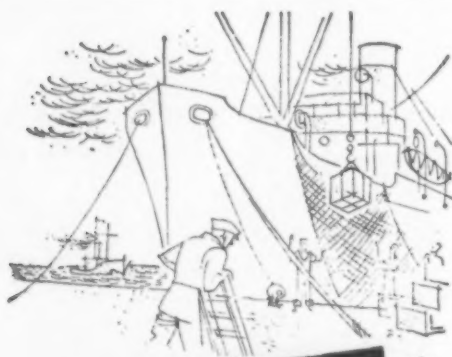
by Robert Gibbings
(Dent, Toronto, \$3.75)

This account of the author's travels and adventures in the south west of Ireland is easy and pleasant reading, though it need hardly be considered an essential part of the equipment of every geographer. Many fields of interest pass in review, from archaeology to yesterday's regatta, and we readily share the author's enthusiastic delight in the people, the birds and beasts, the trees and flowers of the emerald land of Cork.

The personality of the author, and a rich and pleasant personality it is, shows clearly through the unhurried style. Not only the text, but the engravings too, are his work, the latter being notable for their strong clean lines, simplicity of design, and amazing three-dimensional effect, especially in his still life studies of such familiar things as an iron kettle, a snail, or a pond lily.

The Irish speech is there, and it sounds neither forced nor conventional but convincing, and the Irish wit and good humour are there too. Decidedly a book that grows in beauty and interest as one reads.

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XVII

KINDLY MENTION CANADIAN GEOGRAPHICAL JOURNAL WHEN REPLYING TO ADVERTISEMENTS

Venture to the Interior

by Laurens van der Post
(Clarke, Irwin, Toronto, \$3.00)

As for this book, the critics are unanimous—they all insist that it is "real literature", and marvel that a man so efficient as a soldier and as a scientist, so unflagging as an explorer of difficult and forbidding regions, should at the same time be an author of such delicate sensitivity and so successful in enabling the reader to share, not only his physical adventures, but his feelings and subjective impressions as well.

After his return from several years of gruelling experiences in World War II, including a long term in Japanese prison camps, Colonel van der Post was called to London and asked to undertake a thorough exploration of two isolated plateaux on the west side of Lake Nyasa in what used to be called British Central Africa. These two areas, Mount Mlanje and the Nyika Plateau, had been familiar for many years but never more than superficially explored. From the air, they were conspicuous and tempting, and reports brought back by the few hunters, prospectors, and botanists who had ventured a short way in, made it clear that they deserved more detailed study.

Both expeditions were successful and, no doubt, the scientific reports will be published elsewhere. In this book, however, Colonel van der Post who, by the way, is a South African, is rather trying to show us the country through the eyes of a layman or of an amateur explorer at best. In doing so, he has been unusually successful. The book is beautifully written. The tragedy on Mount Mlanje becomes almost a personal loss and the author reveals himself and his emotions with a candour and a sincerity which, in a lesser man, might almost be indelicate, but in this case does but add to his stature.

DOUGLAS LEECHMAN

* * *

Little Giant

by Olive Knox

(Ryerson, Toronto, \$2.75)

This account of the life of Henry Kelsey, which is written for boys, should succeed in arousing their interest and retaining their attention. Kelsey was a fortunate young man who scored a number of worthwhile "firsts" in Canada, including seeing the musk-ox and the huge herds of buffalo on the prairies.

The illustrations by Clarence Tilenius do much to add to the attractive appearance of the book and he succeeds admirably in making his animals look as though they were actual, rather than mere copies of other illustrations.

It is unfortunate that the manuscript was not read by a competent anthropologist before going to press, for there are several unfortunate slips in discussing the Indians and their ways, nor are all the natural history notes quite accurate. However, such things are not likely to disturb the readers for whom the book is intended and the author's prime intention was to interest and instruct them rather than to write a scientific treatise.

DOUGLAS LEECHMAN